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BRITISH MEDICAL JOURNAL

LONDON SATURDAY JUNE 7 1941

THE CALCULATION AND PRESCRIBING OF INFANTS' FEEDS

I. AFTER THE NEONATAL PERIOD: THE USE OF STANDARD MIXTURES

BY

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Physician to the Queen's Hospital for Children; Member of the Staff of the Medical Research Council

The evacuation of babies from cities results in infants on all sorts of feeds arriving in country towns and villages or outlying hospitals, and among the many causes of the drift back to evacuation areas of mothers and babies is difficulty in obtaining help with problems in infant feeding. When so many doctors and nurses whose previous experience has been in other fields of medicine are being called upon to deal with infants in overcrowded clinics, it is hoped that a paper such as this may be of service to some practitioners who have to give instruction in a subject with which they are not thoroughly familiar.

Far the commonest of the gross errors in infant feeding are quantitative; these often arise from difficulties in calculating the calorie value of individual feeds, from failure to estimate the whole twenty-four-hour intake, and from errors in measuring. The object of this paper is to suggest how some of the common problems in infant feeding may be met, and labour minimized, by making up all infant feeds in dilutions to provide 20 calories per fluid ounce—the calorie value of breast milk. Breast-feeding is, of course, to be preferred to artificial feeding, but the management of breast-feeding is not here considered.

Instruction of Nurses in Calorie Requirements

It is necessary for all nurses concerned with infant feeding to know something of calorie values and of how to calculate a baby's approximate quantitative needs, and this they will quickly learn to do if put on the right track. It is helpful to provide nurses with some tabulated information, to be hung up in the ward kitchen, day nursery, or infant consultation room, as the case may be. Tables are here given with this end in view; they can be considerably shortened by those doctors proposing to use only a few foodstuffs for infants.

Table I shows the calorie value in round figures of some of the foodstuffs commonly used for infants in this country. The figures are approximate only, as shown by the following examples: (*a*) The average calorie value per ounce of human milk or cows' milk is probably nearer 19 than 20, but to simplify calculations 20 is generally used for practical work. (*b*) The solids in dairy milk amount to approximately 12½%, and to reconstitute milk on this basis 56 grains of milk powder are required with enough water to make 1 fl. oz. of mixture. However, in this table round figures are again inserted, and 60 grains or 1 drachm (troy) of milk powder is given the calorie value of 20. (If, in fact, 19 is the average calorie value of 1 fl. oz. of dairy milk or of 56 grains of powder, then the calorie value of 60 grains of powder would be 20.4. Thus on this basis the approximate figure 20 given in the table is correct to the nearest whole number.) (*c*) The average caloric value of 1 fl. oz. of sweetened condensed milk is very variable, but is over 100 calories; however, for practical purposes the round figure of 100 is near enough. (*d*) One must remember that domestic measures used for the measurement of feeds are subject also to a considerable margin of error. The use of domestic measures is further considered in a later section.

TABLE I.—*Calorie Values (approximate) of Foodstuffs for Infants*

Foodstuff	Calorie Value
Human milk	20 calories per fl. oz.,[1] 400 calories per pint
Cows' milk	20 .. .. .. ,[1] 400 .. ..
Dried milk:	
Full-cream milk	20 calories per drachm (troy) or per level measure[2]
Half-cream milk, unsweetened	16 .. .. [2]
Half-cream milk, sweetened	16 .. .. [2]
Skimmed milk	13 .. .. [2]
Protein milk	Usually about the same as full-cream dried milk
"Humanized" milk ..	.. ..
Condensed milk:	
Sweetened	100 calories (or more) per fl. oz.—say, 20 calories approximately per level teaspoonful[3]
Unsweetened ..	60 calories (very variable) per fl. oz.—say, 12 calories approximately per level teaspoonful[3]
Dried whey	12 calories per drachm (troy) (very variable)
Sugar	15 calories per drachm (troy)
Castor or granulated ..	15 calories per level teaspoonful[3]
Fats and oils	35 calories per drachm (troy) 50 calories approximately per level teaspoonful[4]
Cereals	12 calories per drachm (troy)
Benger's	60 calories per drachm (troy) 30 calories approximately per level dessertspoonful[4]

[1] For measuring fluid milk or water when no proper graduated measure is available, use the baby's bottle. Do not use tablespoons.
[2] For measuring dried milk the measure supplied for that particular milk powder by the makers should always be used.
[3] For measuring condensed milk (when no graduated measure is available) or for measuring castor and granulated sugar, use a large domestic teaspoon holding just over 1½ drachms (1.6 fl. dr.) by volume.
[4] For measuring Benger's food, use a dessertspoon, holding 1/2 fl. oz. by volume.

Table II gives some simple instructions to nurses for calculating calorie requirements. In essentials it amounts to starting a baby newly under observation on the calorie equivalent of 1½ to 2 oz. of breast milk per pound of body weight per day, and increasing to 2½ oz. or more according to the baby's appetite and progress. Scales of approximate calorie requirements are essential in infant feeding, but naturally any scale must be used with due regard to the individual baby. For the normal baby, appetite and rate of gain in weight form very good criteria of whether or not he is receiving about the right quantity of food, and mothers should be instructed not to press infants to take more than they want. No directions are given in the table concerning the quantitative requirements of the newborn, as this is a subject which cannot profitably be dealt with in a few sentences; it is considered in Part II of this paper.

TABLE II.—*Calorie Requirements per Pound Body Weight in 24 Hours*

Babies of normal weight:
1 week to 5 months old: 50 calories (2½ oz. breast milk or "standard mixture") per lb. body weight.
5 months to 7 months old: about 50 calories, decreasing to, say, 45 calories per lb. body weight.

Thin babies and premature babies:
These require more—say, 55 to 65 calories (2¾ to 3¼ oz. breast milk) per lb. body weight, if they can digest it. Premature babies may temporarily need still more, but should always be started on small feeds.

Fat babies:
These require rather less per lb. body weight than babies of normal weight.

Newborn babies:
The figures given above do not apply to newborn babies, whose food intake in the first days of life is small and increases gradually.

Example of calculation of feed:
A baby weighing 10 lb. is to be given 50 calories per lb. body weight in 24 hours, or 10×50—i.e., 500—calories in the day. If this is made up in the strength of 20 calories per fl. oz. he will require 500÷20—i.e., 25—oz. per day, or five feeds of 5 oz. each, or six feeds of about 4 oz. each.

It is usually wise to start a baby newly under observation on perhaps two-thirds of his full requirement, and work up to the full amount gradually by the end of two or three days if he is taking satisfactorily: sudden large increases in the calorie intake are always risky.

Normal rate of gain:
Babies making satisfactory progress should gain as follows: Under 5 months old, about 6 oz. weekly; 5 to 12 months old, about 4 oz. weekly.

Advantage of Standardizing the Calorie Concentration of Feeds at 20 Calories per Fluid Ounce

If large numbers of babies have to be dealt with the difficulties of supervising feeds are for most of us insuperable without some standardization. By consistently using standard mixtures or solutions, each providing, like breast milk, approximately 20 calories to the fluid ounce, the whole problem can be enormously simplified and labour reduced.

Table III shows the quantities of various foodstuffs, with water, required to provide approximately 20 calories per fluid ounce—the so-called "standard" mixtures of this paper. When feeds have to be made up for a number of babies in a ward they can conveniently be ordered as "standard" mixtures or solutions (see Table IV, last column). Sugar solutions can be mixed once daily and measured out as required for each feed in the day. Dried milk or condensed milk can be mixed at feeding times in one bowl for several babies, and from the "standard" mixture so prepared the necessary volume measured for each infant. On the other hand, if directions are given to the mother the use of the term "standard" mixture is merely confusing to her: she should be told to make up each feed as it is required by her baby, and to give such and such an amount of each constituent, with water to the required number of ounces (as shown in Table IV, third column).

TABLE III.—*Standard Mixtures and Solutions containing approximately 20 Calories per Fluid Ounce*

Dried milk, full-cream[1] [3]	1 dr. (troy) or 1 level measure
With water to	1 fl. oz. (measured with graduated measure or feeding bottle)
Dried full-cream lactic acid milk[1]	Ditto
Dried protein milk[1]	Ditto
Dried humanized milk[1]	Ditto
Dried milk, half-cream[1]	1¼ dr. (troy) or 1¼ level measures
With water to	1 fl. oz. (as above)
Condensed milk, sweetened[2] [4]	1 fl. oz. = 1 level teaspoonful
With water to	5 fl. oz. = 1 fl. oz.
Condensed milk, unsweetened[2]	1 fl. oz. = 1½ level teaspoonfuls
With water to	3 fl. oz. = 1 fl. oz.
Sugar, cane[2]	1½ level teaspoonfuls
With water to	1 fl. oz.
Sugar, lactose[2]	2 level teaspoonfuls
With water to	1 fl. oz.
Cows' milk	10 fl. oz.
Sugar (cane)[2]	8 level teaspoonfuls
33% fat emulsion	1 fl. oz.
With water to	20 fl. oz.

[1] Roller-process-dried milk should be freshly mixed for each feed. Ladle the milk into the makers' measure and level it off without compressing it. Never measure it with a teaspoon. Half-cream unsweetened dried milk and the so-called half-cream milk powder to which lactose has been added by the makers are of about the same calorie value, and 1¼ level measures in a fl. oz. provides about 20 calories per fl. oz.

[2] The teaspoon used for measuring sugar should hold just over 1½ fl. dr.—the same-sized spoon will serve for condensed milk if no suitable graduated measure is available.

[3] A 1-lb. packet of full-cream milk powder per week provides daily about 17 measures, or 17 fl. oz. of reconstituted milk. A 20-oz. (avoir.) tin of milk powder per week provides daily about 20 measures, or 20 fl. oz. of reconstituted milk.

[4] A tin of sweetened condensed milk holding approximately 1/2 pint provides about 2½ pints of standard 1-in-5 mixture.

If all the feeds ordered provide 20 calories per fluid ounce the caloric intake for the day is easily estimated, and if the feed is altered from full-cream dried milk to half-cream dried milk or sweetened condensed milk no intricate arithmetic is involved, as this simply means the exchange of one "standard" mixture for another, ounce for ounce (see Table IV). Without some such basis a baby's feed may be unintentionally doubled or halved in calorie value, with the ill results one would expect. Other reasons, besides simplicity, for giving food of the same calorie concentration as breast milk are that a concentrated feed may lead to overfeeding as a result of thirst, and a dilute feed may be vomited on account of its large bulk. Again, a small or feeble baby offered a dilute feed is likely to weary and to take less than he needs. It is often supposed that by diluting with water so as to provide, say, 10 calories instead of 20 calories to one fluid ounce the feed is made more easily tolerated, but this view is not supported by experience; in fact, a baby inclined to vomit is more likely to keep down the more concentrated feed if both provide the same total calorie value. When nurses have charge of a number of babies on bottle feeds a considerable reduction in labour results from standardizing feeds. Occasionally a dilute feed or a concentrated feed is indicated for some special purpose—for example, concentrated feeds are useful for some babies who vomit from habit, but this does not detract from the usefulness of "standard" mixtures for general use.

TABLE IV.—*Examples of Feeds containing approximately 20 Calories per Fluid Ounce*

Volume of Feed	Foodstuff	Quantity	As Standard Mixtures or Solution
			fl. oz.
2 fl. oz.	Full-cream dried milk	1 level measure	1
	Sugar	1½ level teaspoonfuls	1
	Water to	2 fl. oz.	
	Full-cream dried milk	1½ level measures	1½
	Sugar	1 level teaspoonful	½
	Water to	2 fl. oz.	
	Half-cream dried milk	1¼ level measures	1
	Sugar	1½ level teaspoonfuls	1
	Water to	2 fl. oz.	
	Half-cream dried milk, sweetened	2½ level measures	2
	Water to	2 fl. oz.	
	Dairy milk	1 fl. oz.	1
	Sugar	1½ level teaspoonfuls	1
	Water to	2 fl. oz.	
	Sweetened condensed milk	2 level teaspoonfuls	2
	Water to	2 fl. oz.	
3 fl. oz.	Full-cream dried milk	2 level measures	2
	Sugar	1½ level teaspoonfuls	1
	Water to	3 fl. oz.	
	Dairy milk	2 fl. oz.	2
	Sugar	1½ level teaspoonfuls	1
	Water to	3 fl. oz.	
5 fl. oz.	Full-cream dried milk	4 level measures	4
	Sugar	1½ level teaspoonfuls	1
	Water to	5 fl. oz.	

Measurement of Feeds

Errors in measuring are a constant source of difficulty. For example, fluids (dairy milk or water) are often ordered and measured in tablespoonfuls, each tablespoon being reckoned as half a fluid ounce, whereas most tablespoons actually hold three-quarters to one fluid ounce, so that this may introduce a 100% error. A dessertspoonful is nearer half an ounce than is a tablespoonful, and many London mothers call a dessertspoon a tablespoon. Naturally, proper graduated measures should be used when available.

Even the poorest mother usually possesses a feeding-bottle graduated in ounces, which, if not an accurate measure, is at least much better than a tablespoon. The method of measuring water requires to be explained to a mother. She should be told to mix the feed (dried milk and sugar, or condensed milk) with a small quantity of water, to pour it into the bottle, and add water to the required mark.

Dried milk and sugar are habitually ordered by weight (in drachms troy) and measured by volume. Since the bulk of the same weight of different milk powders varies widely, the amount of each particular milk powder should be gauged by the measure provided by the makers. The powder should be poured into the measure with a spoon and levelled off without compression. The common practice of dipping the measure into the packet and flattening it off against the side results in considerable compression, and hence in overfeeding. Heaped teaspoonfuls are hopelessly inaccurate measures for milk powder. When all care is taken there is still a large personal error; hence in hospital it is desirable that from time to time nurses should check their measurements by actual weighing of measured quantities. Mothers who have no suitable scales can check their measurement by noting how long a packet of known weight lasts. A 1-lb. packet of full-cream dried milk provides in round figures 6 pints of reconstituted milk (more exactly, 5.82 pints containing 60 grains in each fluid ounce); thus one packet a week provides about 17 fl. oz. (more exactly, 16.6 fl. oz.) of milk daily. A 20-oz. (avoir.) tin of national dried milk provides about 7 pints of reconstituted milk (or more exactly, on the same basis as above, 7.29 pints, and a tin a week 20.8 fl. oz. daily). Thus a daily intake of 20 measures of powder—i.e., 20 oz. of reconstituted milk—is equivalent to a weekly intake of about 1¼ packets of the ordinary 1-lb. size, or one tin of national dried milk size. A daily intake of 25 measures is equivalent to a weekly intake of about 1½ packets of the smaller size, or about 1¼ tins of the larger size, and so on. If a baby is not progressing normally on a theoretically adequate feed the quantity of dried milk used in a week should always be checked.

For sugar no measure is usually provided. A large teaspoon may be used. For granulated or castor sugar the teaspoon should hold just over 1½ fl. dr., and a teaspoon of this size should be shown to the mother or, better still, her own spoon be checked. One level teaspoonful of sugar will then be approximately 1 drachm (troy). Lactose varies in weight of a given bulk, but usually a teaspoonful (using the same large teaspoon) is considerably less than 1 drachm.

Condensed milk should, when possible, be measured with a graduated measure. A feeding-bottle is not a satisfactory measure for condensed milk on account of the relatively small volume to be measured. Both sweetened and unsweetened condensed varieties vary widely in calorie value. If the sweetened is reckoned as 100 calories per fluid ounce (an under-estimate in most cases), then 1 in 5 by volume provides a mixture with 20 calories to each fluid ounce. Hence for each fluid ounce of mixture 1.6 fl. dr. of this milk is required—i.e., say one large teaspoonful (level) with water to one fluid ounce. A teaspoonful in an ounce is often called a 1 in 8 dilution, forgetting that a teaspoonful and a drachm are far from synonymous. If the unsweetened condensed milk is reckoned as 60 calories per fluid ounce, then 1 in 3 by volume, or, say, 1½ large teaspoonfuls (level) in 1 fl. oz., provides nearly 20 calories per fluid ounce. The calorie value supplied in condensed milk feeds is apt to be somewhat uncertain on account of the various sources of error, but nevertheless condensed milk feeds are very valuable for premature and feeble infants as well as for newborn babies for whom breast milk is not available. Sweetened condensed milk supplied in a tin holding about half a pint and diluted 1 in 5 provides about 2½ pints of "standard" mixture with 20 calories to each ounce, and calculation of the amount required in a week is an important check on teaspoon measures.

Type of Feeding

The use of "standard" mixtures as here advocated does not tie one down to any one type of feeding: dairy milk, dried milks, or condensed milks can be used with the desired proportions of sugar or with added fat emulsion and sugar (see Tables III and IV). Under the Government scheme for the supply of milk at a cheap rate for infants, at present milk in only two forms is available—i.e., either dairy milk at 2d. per pint or national dried milk (full-cream roller-process-dried milk) at 2d. per reconstituted pint—or free for those parents under a certain income level. It seems likely that the majority of bottle-fed babies in the country will before long be fed on fluid milk or on this powder, more especially as difficulty is already being experienced by mothers in obtaining proprietary processed milks. In common with the majority of paediatricians and infant welfare medical officers in this country I prefer dried milk to dairy milk for routine use for babies in working-class homes on account of its greater safety. Full-cream dried milk carefully used, with varying additions of sugar, will be tolerated satisfactorily by most babies *of normal digestive capacity*, at least after the first few weeks of life. But for babies of poor digestive capacity other processed milks are required if lives are not to be lost unnecessarily. Sweetened condensed milk is needed for premature or feeble infants, for babies in the neonatal period, and for other babies who readily vomit. So-called half-cream dried milk to which lactose has been added in liberal amount by the manufacturers is much used for young and feeble infants, and should usually be given without added sugar, since it already contains a liberal amount. Half-cream dried milk to which no sugar has been added by the makers and dried protein milk are desirable for the treatment of many cases of diarrhoea. Whether or not these will be available in the coming months seems uncertain.*

Vitamin D and iron are supplements which should be provided for all babies. The cheapest and most efficient method of giving these as a routine to artificially fed babies would be by using on a large scale dried milk in which both have been incorporated in adequate amount. But since an iron-fortified milk powder is not quite as easily tolerated as the same milk without added iron, it is wise to begin its administration gradually, as described below. So used, there is no difficulty in getting any baby who is not already upset or suffering from diarrhoea to tolerate it. Unfortunately dried milks fortified with vitamin D and iron are not available under the National Milk Scheme, and proprietary milks (many of which are so fortified) cost 80% to 24% more.

My usual routine when using dried milk, either full-cream or unsweetened half-cream, is to give in each feed approximately 20 calories in added sugar (i.e., 1 oz. of "standard" sugar solution, or 1¼ level teaspoonfuls of cane sugar in 1 oz. of water) and the rest of the feed in "standard" dried-milk mixture. Thus if a baby has a 2½-oz. feed he will have 1½ fl. oz. of dried-milk mixture (half- or full-cream) and 1 oz. of sugar solution, or if he has a 7-oz. feed he will get 6 oz. of dried-milk mixture (full-cream) and still 1 oz. of sugar solution. Babies on small feeds thus get a much larger proportion of the feed in added sugar, the most easily digested part of the diet. More than half the total calories, however, should not be given in added sugar; hence in feeds of under 2 fl. oz. the

* Since this article was written the Ministry of Food have undertaken to issue a national half-cream dried milk (unsweetened) for infants.

amount of "standard" sugar solution will necessarily be less than 1 oz. For many tiny and feeble babies a high sugar feed, temporarily, is desirable, though it must be remembered that babies with loose stools often tolerate a high proportion of sugar badly. If a diet in which only half the calories are supplied as milk is long continued the risk of deficiency disease developing is considerable: therefore as soon as possible the proportion of milk in the feed should be increased and vitamins and iron supplements should be added. If more than 50% of the total calorie intake is given as added carbohydrate there is serious risk of carbohydrate dyspepsia, and loss of weight may be rapid, with irritating frothy fluid stools. As regards choice of sugar, lactose is more expensive than cane sugar and probably has no advantage over it. Sweetened condensed milk provides a feed in which about 40% of the total calories are in added cane sugar, and the commonly used sweetened half-cream dried milk a feed in which, say, 27% of the calories are in added lactose.

Supplementary Feeds

Mothers arriving in reception areas with their babies are likely to be tired, and many will have had a harassing time; as a result their lactation will often prove temporarily insufficient, and if the baby is hungry and cries much of the night his mother's milk will quickly fail, and he and his mother will not be welcome additions to any household. In such cases there should be no hesitation in supplementing one or more feeds each day. If the situation is explained to the mother and her co-operation sought it should often be possible gradually to diminish and cut out the artificial feeding when the mother has been able to settle down in new quarters. By finding those feeds following which the baby cries one can gain a fair idea which feeds it is necessary to supplement, and a co-operative and sensible mother should always be given latitude in adjusting the quantity to the baby's needs. When it is not possible to carry out many test feeds the baby's appetite, together with his rate of gain in weight, usually provides a good indication of the amount of bottle-feeding required.

Symptoms of Underfeeding and of Overfeeding

Underfeeding, however, very often goes unrecognized for many weeks. This is attributable to two main causes: (*a*) many are not familiar with the symptoms, and (*b*) the baby's estimated calorie intake is not compared with his calculated needs. The underfed vigorous full-term baby 4 weeks old and upwards will probably take his feeds eagerly, cry when the feed is finished, and cry before the next one is due—and of course either gain weight at a slow rate or lose in weight. If breast-fed he will suck for a few minutes and then turn away crying, so that the mother often concludes that he refuses to suck because he is in pain and that "her milk disagrees"; sometimes she volunteers that he has pain on micturition because he passes urine about the same time. The feeble or very young baby who is underfed, however, often shows no evidence of hunger, but becomes progressively more lethargic. The stools of the underfed baby may be infrequent or may be excessive in number, and typically are small and greenish brown, with excess of mucus, and sometimes looser than normal, though the quantity passed in twenty-four hours is always small; this distinguishes underfeeding stools from diarrhoea stools. Underfed babies are often brought to the doctor with a complaint of "diarrhoea"—and when in doubt one may have to treat the case as diarrhoea, with a preliminary starve, followed by a steady increase in food, on account of the risk involved in feeding a child who has enteritis. Occasionally vomiting is a symptom of underfeeding: the baby screams, and vomits apparently as a result; but, naturally, caution is necessary in attributing vomiting to underfeeding. Sometimes underfeeding results from inability to get the milk through the teat either because the hole is too small or because the teat is blocked by a badly mixed and lumpy feed, and in such cases one must beware of a history that the baby refuses his bottle.

If overfed the vigorous baby 4 weeks old and upwards usually gets rid of some of the food he does not require by vomiting after feeds, and shows no other symptoms. If, however, he is upset by the overfeeding (a much more frequent event in the bottle-fed than in the breast-fed, and in very young babies than in older ones) he will probably show evidence of discomfort, perhaps have a distended abdomen, and, besides vomiting, he will probably pass an excessive number of rather loose stools, the quantity in the twenty-four hours being also greater than normal. If upset the baby's normal increase in weight will be disturbed, sometimes seriously.

In practice it is common to find that a baby suffering from underfeeding has been diagnosed as overfed; when in doubt, estimation of the food intake is usually the quickest way of reaching the true diagnosis. If there are no facilities for carrying out test feeds the expression and measurement of the whole of one feed may indicate the diagnosis for a breast-fed baby.

Vitamin and Mineral Supplements.—The administration of a supplementary ration of vitamin D, vitamin C, and iron is advised for all babies—breast-fed and bottle-fed. At the present time with shortages of citrus fruits and fish-liver oils instruction is required as to possible substitutes. It seems that in Germany the Government is supplying vitamin D and ascorbic acid for all infants.

Alterations in Feeds

Upsets are often caused by sudden increases in the calorie intake, by sudden changes in the character of the feeds, or by sudden administration of a full dose of iron or even sometimes of cod-liver oil. Nurses and mothers should always be warned to increase food gradually; the average full-term baby, if hungry, can have an increase of, say, 1/2 oz. per feed at a time, and seldom more than 1 oz. increase per feed in a day. Changes from dairy milk or from dried milk containing iron to dried milk without iron, from full-cream to half-cream dried milk, or from any of these to sweetened condensed milk, can safely be made suddenly (provided there is no sudden change in the calorie value or volume of the feed), because ease of digestion increases in this order. Changes in the opposite direction require to be made gradually—e.g., directions to a mother for a change from a sweetened condensed milk feed to a feed of full-cream dried milk might be given as follows, four days being taken over the changes:

Days:	1st	2nd	3rd	4th		
Sweetened condensed milk	4	3	2	1	0 level teaspoonfuls	Four-hourly: 5 feeds in 24 hours
Full-cream dried milk	0	1	1½	2	3 .. measures	
Sugar	0	0	½	1½	1½ .. teaspoonfuls	
Water to	4	4	4	4	4 oz.	

For in-patient work the change over can be made by substituting, half to one ounce at a time, "standard" full-cream dried milk and sugar solution, for "standard" sweetened condensed milk mixture, again taking four days over the change as follows:

Days:	1st	2nd	3rd	4th		
Sweetened condensed milk, "standard"	4	3	2	1	0 fl. oz.	Four-hourly: 5 feeds in 24 hours
Full-cream dried milk, "standard"	0	1	1½	2	3	
Sugar solution, "standard"	0	0	½	1	1	

Summary

Practical points in the ordering, regulation, and measurement of feeds for bottle-fed babies are discussed, and methods of minimizing the risk of quantitative errors are indicated. The employment of feeds providing 20 calories per fluid ounce for all infants, unless there is some special contraindication, is strongly urged on the ground that thereby (*a*) there is a much-reduced risk of quantitative mistakes for the infant, (*b*) feeding is greatly simplified for doctors and nurses, and (*c*) labour is lessened in children's wards or day nurseries.

Tables are given for the instruction of nurses in infant feeding. These can be adapted and shortened by the doctor in accordance with the type of feeding he habitually uses. It is hoped that feeding standardized to the extent here suggested may be widely adopted at the present time, for it offers a way of coping with the difficulty of ordering feeds for large numbers of babies brought into reception areas on feeds of every description.

[The concluding part of this paper—giving practical points in the regulation of feeds during the neonatal period—will appear next week.]

AETIOLOGY OF DA COSTA'S SYNDROME*

BY

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We have seen that the symptoms and signs of Da Costa's syndrome are produced by central stimulation; that hyperventilation and hyperadrenalism, though they may be sometimes concerned with the mechanism of symptom production, are not aetiological diagnoses. There remains to be considered the real nature of the syndrome, the origin of the central stimulation. It must be emphasized that the condition is as common in civilians as in soldiers, as was known to Da Costa, and that even when it occurs in soldiers it was present before enlistment more often than not (Table XIII). This disposes of the idea that the essential

TABLE XIII.—*Onset in Relation to Army Life*

	Parkinson, 1916	Lewis, 1918	Hume, 1918	Barlow, 1920	Wood, 1941
No. of cases	40	558	1,000	382	225
New (since enlistment) ..					26.6%
Recurrent (relapse since enlistment)					6.6%
Lifelong					18.6%
Total pre-war	72.5%	43%	54%	51%	73.3%

cause of Da Costa's syndrome is specially related to war service or to Army life.

Most authors agree that in any patient so many things have combined to produce the syndrome that it is very difficult to pick on one. For this reason the incidence of the various aetiological factors recorded in the literature is confusing (Table XIV). It is clear, however, that trauma, high explosive, wounds, and gas poisoning are relatively unimportant. The chief factors seem to be the family history, constitutional incapacity, infection, neurosis, and undue mental or physical strain. In order to assess their significance and to search for a common basis, I have made a detailed study of the histories of 100 unselected cases. At once two things were obvious. First, severe mental or physical strain was no more important than rough conditions, discipline, the change from an individual with private rights to a number on an index card, fear of having to kill

* The last of three Goulstonian Lectures to the Royal College of Physicians of London, 1941. The first and second lectures appeared in our two preceding issues.

TABLE XIV.—*Incidence % of Apparent Aetiological Factors*

	Da Costa, 1871	Parkinson, 1916	Lewis, 1918	Hume, 1918	Venning, 1919	Barlow, 1920	Krogh *et al.*, 1920	Craig and White, 1934
No. of cases ..	200	40	558	1,000	7,803	382		
Constitutional ..					9–12			
Infective	47.5	42.5	33	21.5	20–22	53	41.4	9
			Factor 55					Factor 61
Neurotic					5–13.6	3.4	2.3	80
								Factor
Severe mental or physical strain	38.5	10	11	11.3	19–36		Few	10
								Factor 61
Trauma without injury	+			2.1				
Exposure to high explosive				3.6			2.5	
Wounds	Very few			1.1		2.5		
Gas				1.8	1–10.6	5	Very few	
Multiple	Usual				16–27			Usual
Unknown gradual onset			56	54.3				

or of being killed, and the everlasting anticipation of the worst—in short, fear of and dislike for Army life. This attitude was a factor in the majority. Secondly, a psychiatric diagnosis could nearly always be made—e.g., depressive state, anxiety neurosis, hysteria, hypochondriasis, etc. I am not competent to discuss this aspect, which is being ably handled by my colleagues Dr. Aubrey Lewis and Dr. Maxwell Jones, but I shall try to describe the more obvious emotions, misinterpretations, and psychological twists which lie behind the somatic manifestations of this syndrome. It is not enough to unearth psychopathology: it is necessary to explain the incapacity for effort.

Family History

Oppenheimer and Rothschild (1918a, 1918b) found a family history of nervousness, insanity, or epilepsy in 56% of 100 unselected cases. Swan (1921) recorded undue nervousness in the parents of 51.7% of 58 cases. The incidence of these traits in the family histories of patients with recognized psychoneurosis is a little higher—e.g., 74% (Wolfsohn, 1918a, 1918b), 57.7% (Salmon, 1929), 60% (Yaskin, 1936), and 75% (Kozol, 1940). In 100 controls reported by Wolfsohn there was a family history of nervousness in 15%, but insanity and epilepsy did not occur. Table XV shows my own findings in 210

TABLE XV.—*Percentage with Family History*

	210 Militiamen			175 E.M.S. Patients
	50 Normal	75 Organic Heart Disease	85 Da Costa's Syndrome	
Probable organic heart disease	8	8	5	8
Probable "cardiac neurosis"	0	4	25	42
"Nerves"—heart not accused	4	4	23	19
Total with neurosis or "nerves"	4	8	48	51

militiamen and in 175 patients at the Emergency Hospital. The high incidence of nervousness and "cardiac neurosis" in the families of patients, compared with those of controls, is confirmed; of equal importance, perhaps, is the fact that the incidence of organic heart disease was the same in all groups, showing that nervousness is the important factor, not its disguise as heart disease. Either or both parents were afflicted. It was rare to find brothers or sisters with similar complaints unless these were also found in a parent. Whether the parental factor has a hereditary, congenital, or environmental influence has yet to be learned.

Constitutional Factor

It may be thought that this implies constitutional incapacity for effort, or, as Kerley (1920) puts it, "that it is impossible to get out of any piece of machinery work which the machine was not intended to accomplish." In the light of many careful histories I find it difficult to accept this view. In childhood these patients are timid and delicate; they cling too long to their mothers' skirts. On the approach of the evil day when they will have to attend school they are filled with apprehension; if the dire event is not delayed by some happy illness (rheumatic fever followed by an open-air school is especially welcomed) they spend the next few years as trembling spectators of the rough-and-tumble of the miniature world about them. They evade as much as possible, with the help of friendly coughs and colds; kindly doctors and soft mothers are at hand to protect them from the hazards of football, swimming, and the gymnasium. Phobias, tics, bed-wetting, nightmares, and stammering are common traits. But they may not develop effort intolerance until they are 10 or 11 years old, or not until much later.

The case histories suggest that parental influence causes timidity and character inferiority, but not effort intolerance; for out of 66 with a constitutional factor, only 11 were incapable of effort for as long as they could remember, the other 55 relating the onset of this disability to other factors. It is probable, but difficult to prove, that similar incidents operated in the 11 mentioned, but at a very early age.

I had hoped that studies of children with Da Costa's syndrome would yield more light on the matter, but such observations as have been made are not helpful. Martius (1899) and Fairbanks (1907) blamed the heart; Bass and Wessler (1913) absolved it. Kerley (1920) thought there was constitutional incapacity for effort. Halsey (1920) blamed parents and doctors. Lincoln (1928) showed how encouragement and proper management improved them. Many of these children had orthostatic albuminuria, and are described in the literature under that heading. Robey and Boas (1918) found it in 6 out of 27 adults with Da Costa's syndrome, and Dr. Archer has discovered it in a number of our patients at the Emergency Hospital.

The family history was positive in 60 out of the 66 patients with a constitutional factor and in all of those with lifelong effort intolerance. It was positive in 15 out of the 34 without a known constitutional factor.

Here is a typical case history illustrating apparent constitutional incapacity for effort:

Case 37.—Mother suffered from nervous breakdowns. As a child the patient was nervous and delicate. He was unable to walk far without fatigue, and even up to the age of 7 he was given "piggy-back rides" whenever he was tired. He suffered from frequent minor ailments, such as earache, toothache, and headache. His doctor blamed his heart, and said he would need a great deal of care and attention. He has had symptoms as long as he can remember. He avoided games at school, although not forbidden to play them, and has always lacked stamina and courage. At the age of 17 another doctor told him he must have more rest, and he took this advice. He was conscripted in April, 1940, and reported sick immediately.

The Direct Association of Effort with Fear

In its pure form this link is forged when effort is associated with circumstances which induce fear. Da Costa's syndrome was initiated in this way in 19 of the present series. Constitutional timidity and character inferiority without effort intolerance preceded the onset in 16 of them. In considering the constitutional factor one of the common errors arises out of the interpretation of symptoms provoked by games at school. Careful questioning revealed that initially only two games were involved—football and swimming; running, cricket, and other activities being tolerated. Football caused symptoms because the boy was afraid of being hurt; swimming, because he was afraid of drowning. The symptoms were those of panic, but the boy himself, his mother, or his doctor misinterpreted them as indicating heart disease, whereupon a new fear developed—the fear of sudden death on exertion. Any kind of effort then produced symptoms. This mechanism need only operate a few times in order to form a habit or conditioned response which maintains the symptoms when conscious fear is lost. Every time symptoms occur they are misinterpreted, and so by constant repetition a deep-seated conviction that the heart is diseased is welded into the mind.

Case 10.—This man's father had "effort syndrome" in the last war, and his mother was nervous and inclined to dizzy attacks. Up to the age of 9 he was able to run without distress, but after playing football during his tenth year palpitations and breathlessness occurred on any kind of exertion. He revealed that he was afraid of being hurt at football, and used to get upset when he was called a "funk." Similar symptoms on swimming were associated with considerable fear of drowning. He misinterpreted the effects of his emotion, and came to believe that he had heart disease. Fearing sudden death and assuming that effort would hasten his end, he avoided all games, and was glad to have the excuse. He has had "effort syndrome" ever since.

Case 6.—Positive family history. When an infant the patient was in his mother's arms when a bomb fell during a London air raid and blew them through a doorway. As a young child he had a morbid fear of fireworks; otherwise he was fit and strong. He was called up in September, 1939, and remained well until March, 1940, when he was told to unload an ammunition lorry. On handling the shells he became curiously panic-stricken, and developed somatic symptoms, including a sharp left-breast pain which made him think he had strained his heart. His condition was aggravated by his experiences at Dunkirk, which had a peculiar significance for him. Anxiety dreams followed. The theme running through this story is unmistakable. He accepted the explanation offered and was reassured. He improved remarkably, entirely lost his pain, and did our hardest-grade exercises and route marches without symptoms. However, as his fear of explosions was undiminished he was sent back for non-combatant duty.

Case 3.—Positive family history. A nervous and delicate child, but physically quite capable. He joined the police at the age of twenty one, and remained well, although prone to palpitations on excitement. One day, at the beginning of September, 1939, he was suddenly roused from sleep by his brother, who told him war was declared and an air raid was in progress. He jumped up, dressed hurriedly, and was running down the street before the alarm had stopped. He said it was like a nightmare: his tongue felt like leather, his mouth was very dry, his heart was pounding, and then he was seized with a cramp-like pain in the left side of his chest. Believing it was coming from his heart, he thought he was going to die; sweat poured from him, and he collapsed. He has had "effort syndrome" ever since. However, excitement, noise, and especially gunfire are more effective than effort in bringing on his symptoms, and on one occasion when he was knocked down by the explosion of an incendiary bomb his initial attack was repeated in every detail.

Inframammary Pain associated with Effort

In 6 cases the onset of Da Costa's syndrome was clearly related to a particular incident in which left inframammary pain was provoked by specific effort. The pain was misinterpreted as arising in the heart; fear of sudden death induced palpitations, etc.; these added symptoms confirmed the misinterpretation and so completed the vicious circle. The mechanism operated in three other cases, but in them it was not responsible for the onset.

As the histories of these 6 patients were identical in principle, only 1 will be quoted.

Case 5.—Positive family history. The patient was a clerk studying accountancy in civil life, and was conscripted in

June, 1940. He had always been well, but was not robust. He trained satisfactorily, but one day, while walking up a hill, carrying a heavy sandbag he tripped, felt something snap in the left side of his chest, and experienced a severe left inframammary pain. He thought he had strained his heart; he became frightened, developed palpitations which confirmed his fears, and reported sick. The doctor supported his belief, and allowed the syndrome to become established. Since then the patient has been afraid of exerting himself lest he should fall down dead, and symptoms have occurred when he has undergone exertion.

Induced

Da Costa's syndrome may be induced by the doctor or by some other person in authority, or it may be self-induced. The doctor was responsible in 17 cases, and was an important factor in 16 others. The accidental finding of a systolic murmur or of tachycardia is usually the source of error. Evidence of predisposition is common.

Case 41.—The family history was positive, his father having "effort syndrome." The patient was always nervous, delicate, and sensitive, but was a good cricketer, and had no symptoms on effort. He became a clerk in civil life. In March, 1940, he had a sore throat, and was told by his doctor that his heart was affected and that he must take things very quietly. He became worried, feared sudden death, and thought that exertion would increase the likelihood of this. At his medical examination in May he was put down for light training, and he interpreted this as meaning that his heart was weak, confirming his doctor's view. After two weeks in the Army he broke down, and was told by his medical officer that his heart was enlarged. Two weeks later another medical officer told him that his heart had not grown to its proper size and was too small. He became more than ever anxious about it, and wondered what the truth of the matter really was. Symptoms on effort were now well established. He accepted our reassurance and explanation, whereupon he lost his fear of effort, and was able to undertake much, symptom-free; but his extreme nervousness of air raids, guns, and all military contrivances prevented his return to full health.

The importance of a predisposing factor was determined by a study of unselected recruits who have been told erroneously that they had heart disease (Table XVI).

TABLE XVI.—*Influence of Doctor's Statement*

	No. of Cases	Developed Da Costa's Syndrome	Uninfluenced
Subjects informed that they had heart disease	59	33	26
Family history of "cardiac neurosis" or nervousness	30	27	3
		Obeyed	Disobeyed
Activity restricted by doctor ..	48	37	11
Positive family history	28	27	1

The influence of a positive family history is unquestionable, for it was present in 82% of those who developed Da Costa's syndrome, compared with 11% of those who did not, and it occurred in 73% of those who obeyed their doctor's instructions, compared with 9% of those who did not. Again, in the present series of 16 induced cases of Da Costa's syndrome the family history was tainted in 12 and the constitutional factor was found in 11. It requires more than a mistaken doctor to induce Da Costa's syndrome; it requires peculiar soil. Given the suggestible subject, however, the doctor often succeeds in linking emotional reactions to effort by grafting on to the mind of the patient the idea that his heart will not stand up to exertion. These patients really believe that they may die suddenly when they exert themselves. Their emotion may be compared to that of a blindfolded man who sets off towards a precipice to fetch something from its brink. The symptoms which ensue, especially the palpitation, seem to confirm the danger. It is possible that a conditioned reflex becomes established which maintains the reaction.

There were 4 cases in the series of 100 which were self-induced, the patient misinterpreting innocent palpitations or a minor attack of dizziness as an indication of heart disease, on the basis of his familiarity with similar symptoms in close relations who were supposed to have heart disease.

Case 1.—Bad family history. The patient was a nervous delicate child who became a farm labourer at the age of 14 and was able to do heavy work without any trouble. In 1930, when he was living with his uncle, he learned that his father had died of heart disease following the heaviest day's work of his life. His uncle often used to speak of this, and was said to have heart disease himself. One day the patient developed palpitations and immediately believed that his heart was diseased like his father's and uncle's. He feared that he would drop dead as his father had done before him at the age of 31. He therefore avoided effort, as he believed this would hasten his end, and he has done nothing but light work since. He was called up in August, 1940, and fell sick at once with the usual symptoms. He had a deep conviction that his heart was diseased, and nothing would alter his view. His fear of effort was very real and no doubt produced an emotional reaction.

The Infective Factor

Numerous observations in the literature that infection may be the direct cause of "effort syndrome" are singularly unimpressive. Slight leucocytosis (Grace Briscoe, 1917; Swan, 1921) no more favours a toxic focus than it does emotional stimulation (Menkin, 1928—quoted by Cannon, 1929; Wittkower, 1935). The erythrocyte sedimentation rate is almost invariably normal (personal observation). Removal of septic tonsils, cleaning up dental sepsis, and puncturing antra offer no encouragement. Nevertheless Da Costa's syndrome often follows rheumatic fever, influenza, pneumonia, and other fevers, and did so in 17 of the present series, and was aggravated by them in 29 others. Careful history-taking, however, revealed quite another source for the origin of the syndrome, infection playing the same part as bad conditions, gassing, high explosive, concussion, trauma without serious injury, etc., preparing the ground by causing confusion, increased suggestibility, and loss of morale and vitality. It is known that such conditions predispose to the development of a neurosis (Schwab, 1919; Salmon, 1929). In the 17 cases mentioned above, Da Costa's syndrome was traced to emotional causes in 14; proof was lacking in the other 3. The chief factor was the belief, induced by the doctor, that the heart had been injured by the infection—a factor whose power has already been weighed. It is therefore not surprising that rheumatic fever heads the list of these infections; influenza may come second because of the fallacious belief that it, too, injures the heart and because of its notorious influence on morale.

Case 70.—This man was admitted to the Emergency Hospital with a diagnosis of post-infective "effort syndrome," the symptoms occurring after an attack of meningococcal meningitis. The true history, however, reveals a different origin. He was born in 1916, when his mother was very nervous on account of air raids and because her husband had been killed on active service. He was wrapped in cotton-wool and olive oil for the first six months of his life, and was treated with cod-liver oil and malt for years on account of his supposed delicacy. At 11 he was seen by a doctor and was said to have V.D.H., for which he was treated with more cod-liver oil. He left school at 14 and has worked as a laundry clerk and carman ever since, avoiding heavy work on medical advice. He was called up in April, 1940, and was terrified at the idea of fighting. He used to lie awake at night with sweating hands and feet in anticipation of the

horrors of battle. He developed meningitis a month later, and dermatitis, influenza, and tonsillitis followed in quick succession. He became panic-stricken during air raids or even when planes passed overhead. His somatic symptoms gradually increased, and in view of his previous history he interpreted them as cardiac in origin. He has been unable to concentrate, has nightmares, and is very fatigued. After reassurance, explanation, and the promise that he would be discharged from the Army he has improved to such an extent that he is now capable of full physical effort, symptom-free.

It may be objected that this case had too strong a constitutional factor to provide a fair example: but the constitutional or parental factor was found in all but 3 of these cases; and emotional factors were shown to be equally powerful in these 3, details of which are given because I believe them to be important.

Case 65.—This man was perfectly fit until January, 1940, when he had a bad attack of influenza. "Effort syndrome" followed, and was supposed to be of the post-infective type. However, a careful history revealed that after his influenza he became anxious about his business, which he had left in the care of his wife, who was not managing it satisfactorily. His affairs were disordered, and when his home town was bombed his anxiety became acute. While he was at our hospital I gave him a week's leave to put his affairs in order. He was able to move his wife to a place of safety, and he left his café in trustworthy hands. He made an immediate recovery, performed the hardest-grade exercises without the slightest distress, and was returned Category A1.

Case 8.—This man was perfectly well until he had a severe attack of rheumatic fever in February, 1940. He was put on the danger list, and thought he was going to die from acute inflammation of the heart. The usual symptoms developed during convalescence, and he became anxious as to his condition. Reassurance and encouragement combined with explanation resulted in cure; he was able to perform our hardest-grade exercises symptom-free, and was returned Category A1.

It will be noted that although this case illustrates as pure an example of post-infective "effort syndrome" as one could wish to see, the fear of death and the doubt whether his heart had really recovered were the important factors in the production of his symptoms.

Case 33.—This man was perfectly well until 1936, when he was off work for two months with pleurisy. He made a complete recovery, was called up in August, 1939, and remained fit for four months while driving 15-cwt. trucks in France. In January, 1940, however, he developed influenza accompanied by left chest pain. The medical officer discovered tachycardia, and the patient then interpreted the pain as due to heart trouble. This idea was confirmed when he found he was dizzy on resuming his driving occupation. He became anxious that he might have an accident resulting from his dizziness; his symptoms increased, and he became more than ever convinced that his heart was to blame. On account of the pain in the left chest we were unable to convince him that his heart was innocent.

Acute Emotional Reactions

There was a group of 13 cases in which the onset of Da Costa's syndrome was intimately connected with emotional reactions unrelated to effort or to any factor previously mentioned. In 8 of them the symptoms were misinterpreted and the heart was blamed, the development then following the lines of the induced or self-induced cases; the other 5 patients had full insight into their disability. An example of each type is given.

Case 9.—Positive family history. The patient was a nervous child, and one day during a geography lesson he had an attack of palpitations. It appears that geography was his worst subject, and he used to become very confused and anxious during these lessons. He seemed quite unable to master the subject; but, being conscientious, he struggled unsuccessfully to do so, and his attack was the result of emotion. He became very frightened; he was put outside, given sal volatile, and taken to the doctor, who told him he was anaemic. The boy, however, thought his heart was to blame, feared to exert himself, and developed palpitations, breathlessness, and choking sensations if he did so. One day he fell down some steps. He saw his doctor, thinking he might have injured himself. He was told he had tachycardia, and was kept under observation for eight months. He admits he was emotionally upset by his fall, and that his heart always raced in the presence of doctors. He was ordered light work. This he took to denote serious heart disease, and it appeared to confirm his earlier belief. The first time he did heavy work after this he felt ill, thinking he had strained his heart. Gradually, however, he undertook more, since having an interesting job he thought little about his condition, and as a result of experience he came to be reassured. But some time later, while climbing a steep hill, he became aware of palpitations, and his previous ideas were suddenly revived. He struggled on in great fear, and collapsed on the top of the hill, lying exhausted there for an hour. He was called up in September, 1939, and survived training for nine months. When his work became more strenuous he reported sick. He was convinced that his heart was responsible for his condition.

Case 92.—Born of a nervous mother, this man was always delicate and easily frightened, avoiding games at school because he was afraid of being hurt. He had a family love for horses, and at the age of 15 applied for a position in a racing stable at Newmarket. While standing on a platform previous to the interview, he had his first attack of palpitation, which he knew was due to emotion. Since then he has been prone to palpitations on excitement. He became a jockey, but was ashamed to find that he was afraid of accidents, and he began to dread riding. A variety of accidents increased this fear, and he finally gave up this work, so cutting himself off from the major interest of his life. During this period his symptoms occurred chiefly when riding, and he was fully aware of their cause. Later they developed on any exertion. He became a commercial traveller and improved in health. He joined the Army in May, 1940, and broke down at once, following inoculation; but he is well aware that the inoculation had little to do with his breakdown. He knew that he could not tolerate Army life, being terrified of anything associated with war.

Fear of War

This was an admitted factor in 40 cases, and probably occurred in many more. Patients do not readily admit what they believe to be cowardice. Fear was more often due to anticipation of battle than to experience of it, in the proportion of 34 to 6. It was the sole cause of Da Costa's syndrome in only 3.

Case 49.—Born of a nervous mother, this patient as a child was timid, and suffered from frequent bilious attacks; otherwise he was well, and physically fit. When war broke out he was very frightened, and wondered how he could escape military service. He pleaded financial difficulties, but this did not succeed. His first anxiety attack then occurred when riding in a bus. He made a second application for exemption, and this was also rejected. Next he went to see his doctor in the hope that he might be turned down on medical grounds, although at that time he did not think there was anything the matter with him. To his great joy, however, he was told he had a "rough heart," and would not be accepted by the medical board. A fortnight later he was dismayed to be passed Grade I. He made a final attempt to escape by applying for a job as a bus-driver for workers in a munition factory, but this failed to eventuate, and he joined his regiment. By this time his symptoms were well established, and he reported sick immediately. He was put on light duty, but steadily deteriorated, and was at last sent to us. The somatic effects of his fear were considerable, both subjectively and objectively, and were not especially associated with effort. Despite the obvious cause of his illness he really seemed to believe that his heart was weak, and feared to exert himself. I need hardly say that this story was not divulged at first.

Trauma without Serious Injury

This was a factor in 8 cases, and was responsible for the onset of symptoms in 2. Both patients admitted that they had lost their nerve: emotional symptoms were taken

to represent heart trouble, and the development and maintenance of the syndrome followed the lines of the post-infective cases. Motor-cycle accidents, falls from heights, a thrashing in the boxing ring, were each noted more than once. More serious injury seems to give a peculiar satisfaction to the patient: he receives true sympathy and respect, even a certain amount of honour, and there is no injury to his pride. Such men rarely develop a neurosis.

Discussion

The groups described are summarized in Table XVII. The essential common factor was the emotional reaction. The special feature which distinguished the group from other psychoneurotic physical patterns was the establishment of a link between the emotional reaction and effort. This link was usually forged when emotional symptoms were misinterpreted and the heart blamed, so that fear of effort followed. The two steps were telescoped when the initial emotional reaction happened to occur during effort, for effort was then blamed at the outset. In a few cases emotional reactions were so severe, frequent, or protracted as to incapacitate without being linked to effort, an extreme example of this mechanism being paralysis by fright: a person in extreme fear may fight, flee, or collapse, and in this group we seem to be dealing with the third of these alternatives.

TABLE XVII.—*Cause of Incapacity for Effort in 150 Cases*

	Factor		Initial Cause	
Positive family history		75		
Constitutional		66		11
Coincidence of fear and effort		26		19
Traumatic left inframammary pain		9		6
Induced: by the doctor	33	39	17	21
Induced: by autosuggestion	6		4	
Infection: uncomplicated	21	46	3	17
Infection: complicated by influence of doctor	16		9	
Infection: complicated by autosuggestion	9		5	
Acute emotional reaction from causes not mentioned under other headings: misinterpreted	17	27	8	13
Acute emotional reaction from causes not mentioned under other headings: understood	10		5	
Fear of battle: anticipated	34	40	2	3
Fear of battle: experienced	6		1	
Trauma (without serious injury)		8		2
Known psychiatric disorder, but link with effort not established				5
Unknown				3

A careful study of several hundred histories has convinced me that the subdivision of "effort syndrome" into constitutional, induced, post-infective, psychoneurotic, and physically fatigued types is misleading if not meaningless. The mechanism outlined above could be demonstrated in 55 out of 66 constitutional cases, in all 21 induced cases, and in 14 out of 17 post-infectives; while 94% of the series were psychoneurotic and none merely physically fatigued. The constitutional factor was timidity, and fear was usually linked to effort during football, swimming, or other relatively dangerous activity at school; induced types were established when the patient was led to believe that his heart was weak and that effort might provoke sudden death; post-infective cases were commonly induced by medical or parental suggestion, or by autosuggestion.

The emotional reaction produced by effort after the required link is established is immediately misinterpreted, the symptoms being put down to effort itself. In this way a vicious circle is set up, and the patient's ideas are confirmed. It is suggested that, by a process of conditioning, effort may henceforward cause an emotional reaction, whether conscious fear is retained or repressed. Such a reflex would be facilitated by frequent repetition, and every time the meaning of the symptoms was misconstrued another layer would be added to the depth of the patient's conviction that his heart was at fault and effort dangerous. Continued or repeated emotional experiences complicate the syndrome, and, as would be expected, there are numerous varieties and elaborations of this essential mechanism.

I believe the evidence demands that Da Costa's syndrome be regarded as an emotional reactive pattern peculiar to psychopathic personalities and to subjects of almost any form of psychoneurosis. If this conclusion is correct then "effort syndrome" cannot be accepted as an adequate diagnosis. In these lectures I have paid no attention to psychiatric labels, but it should be clear that one or another could nearly always be affixed. If it is thought expedient to draw attention to the incapacity for effort, an example of a proper diagnosis might be: anxiety neurosis (effort intolerance).

Treatment

The treatment of Da Costa's syndrome depends upon our understanding of the mechanisms involved in its development, and must be largely prophylactic. Parents, child welfare clinics, and family and school doctors may prevent or provoke the condition. The failure to diagnose rheumatic carditis may be a bad mistake, but its diagnosis where none exists is worse. Militia medical boards must learn to recognize personalities that will not stand up to military service; a few intelligent questions are worth ten effort-tolerance tests. The medical officers in the Services must learn to diagnose neurosis on positive grounds; no greater blame can be attached to a psychiatrist who fails to make a physical examination than to a physician who fails to probe the mind. A few pertinent questions and the ability to listen to the replies are all that is required; lengthy details are not needed for diagnosis.

When the condition is discovered the patient should be handled firmly but with understanding by the medical officer of the unit. It is usually possible to decide at once whether the man is capable of adjustment and worth encouraging, or whether he is better discharged from the Army. Only the doubtful cases and those in which a little more time is needed should be sent to hospital.

Patients should be informed of the nature of their illness and be treated as psychoneurotics; their distaste for this label may prove quite helpful. The psychotherapy required is simple in its object and extremely difficult in practice. The patient must be induced to believe that he is suffering from the effects of emotional disturbance and not from any disease or alteration of visceral function. No more is gained by telling him that he has a nervous heart than by saying there is nothing wrong with him or that he has a weak heart. Reassurance can only be coupled with adequate explanation in terms that he can understand, the object being to discover the truth and then to expound it. If emotional stimuli are due to false fears—e.g., to misinterpretation of innocent symptoms—they can be removed; if to real fears, the patient must be encouraged to overcome them, and if he cannot he may at least learn to adjust himself to their presence. If the agitating stimuli are too much for him he is best removed from their presence after reasonable trial. It is most important that these measures should be adopted quickly, to prevent the establishment of a habit. As Cannon (1928) says: "Every time the nerve impulses traverse a given course they make easier the passage of later impulses. Thus habitual emotional expressions, both in the facies and in the viscera, may become fixed and deep-set in the neural organization, just as the complicated adjustments of swimming, skating, or bicycle-riding become inwrought during our later years by repeated practice."

If these men are to be of service to the nation they must receive individual consideration. If they are expert in some particular line they should be given employment in that line; if their civil work is of national importance it may be wise to discharge them from the Army; if anticipa-

tion of active service is the root of the trouble, give them non-combatant duty. We must not let our own emotions govern our treatment of these men, many of whom suffer more than we are aware. We should endeavour to make the most of material which is not suited to warfare: a man working is an asset; a man broken, a liability.

Physical rehabilitation helps normal subjects who are convalescent from infectious fevers or those who are simply out of training; but as a treatment for Da Costa's syndrome it evades the issue, and is about as effective as psychotherapy for cancer. The matter is discussed by Sir Adolphe Abrahams (1941). Occupational therapy prevents introspection and adds interest to the day, but it has little bearing on the outcome, according to Dr. MacIntyre, who has looked into its effect at our hospital. There is evidence, however, that with nothing to do patients tend to get worse.

Drugs are rarely indicated. Bromide or luminal may be of occasional value. Benzedrine on rising has been used with success to produce temporary improvement as an aid to psychotherapy (Myerson, 1936; Wilbur, MacLean, and Allen, 1937), and I have sometimes found it useful.

Prognosis

In considering the results of treatment recorded by different authors it is wise to compare only the percentage returned to full duty, for whether a soldier is put on light duty or whether he is discharged may depend upon the importance of his civil occupation. The figures rest to a great extent upon the nature of the material: thus Oppenheimer and Rothschild (1918b, 1918c) sent back to full duty 85% of 39 cases with a good background, compared with 9% of 46 constitutional cases; Krogh's 60% figure refers to men who were simply untrained to physical effort—a type which should hardly be included, for such men show no evidence of autonomic disturbance; the high returns of Hume (1918) and of Venning (1919)—58% and 48% respectively—were reported from the same centre in France, and depend upon a low incidence of constitutional cases and upon a correspondingly high incidence of types with recent onset. The average percentage returned to full duty by other authors is about 30—e.g., Da Costa (1871), 38%; Lewis (1918), 20%; Friedlander and Freyhof (1918), 30%. In my own series of 182 cases 31.3% were sent back to full duty and 36.3% to light duty; 32.3% were discharged. A recent follow-up shows that 25% are still on full duty.

The only reliable method of assessing the immediate prognosis is to consider the history—providing it is adequate. Table XVIII, which compares the accuracy of predictions based on the effort-tolerance test, the breath-holding test, the number of physical signs, and the history, shows this clearly. Full duty was predicted on a one-minute deceleration time, on a breath-holding time of at least thirty seconds, on the presence of not more than four of the physical signs, or on an encouraging history which involves consideration of too many points to enumerate; light duty, on a two-minute to three-minute deceleration time, on a ten-second to thirty-second breath-holding time, on the presence of five to eight physical signs, or on an indifferent history; discharge on a deceleration time over three minutes, on a breath-holding time under ten seconds, on more than eight physical signs, or on a bad history.

TABLE XVIII.—*Comparison of Factors influencing Prognosis*

Basis for Prognosis	Percentage of Correct Predictions			
	For Full Duty	For Light Duty	For Discharge	Average for all Groups
Effort-tolerance test	33.3	32.0	33.3	33.0
Breath-holding test	42.0	38.0	53.0	44.3
The number of signs ..	58.5	49.5	58.0	55.3
History	79.0	62.5	94.4	78.6

These predictions were made at the first examination of the patient. The history is seen to be by far the most important guide; the number of physical signs comes next; the breath-holding time is better than nothing; while the effort-tolerance test is valueless, for the prognosis based on a knowledge of the total results obtained would be about 33% for each category anyway. The final disposal of the cases upon which these figures are based depended chiefly upon the sorting obtained by means of graduated exercises and route marches—at any rate in respect of those sent back to full duty.

The ultimate prognosis was investigated by Grant (1925). Of 601 cases studied over a five-year period following the last war 15.3% recovered, 17.8% improved, 56.2% were unchanged, and 3.2% were worse; the remainder developed serious disease of one kind or another. The age of the patient was important, for the percentage of cures fell from 25 in the group aged 17-20 to 2.1 in the group aged 41-50.

Summary and Conclusions

The symptoms and signs of Da Costa's syndrome more closely resemble those of emotion, especially fear, than those of effort in the normal subject.

The mechanism of the somatic manifestations depends upon central stimulation, not upon hypersensitivity of the peripheral autonomic gear.

This central stimulus is emotional, and is commonly the result of fear.

The reaction becomes linked to effort by a variety of devices, which include misinterpretation of emotional symptoms, certain vicious circular patterns, the growth of a conviction that the heart is to blame, consequent fear of sudden death on exertion, conditioning, and hysteria.

Incapacity tends to be exaggerated consciously or subconsciously in order to protect the individual from further painful emotional experience.

Treatment in the Army is shackled by inability to remove the distressing environmental factors which have caused or have aggravated the breakdown; by the difficulty in establishing intimate contact with a patient who did not choose his medical confidant; by the duty of having to serve the State first, the patient second.

It is urged that the diagnosis of "effort syndrome" be dropped. A proper psychiatric diagnosis is nearly always available: if attention is to be called to the presence of effort intolerance, let effort intolerance be added (in brackets).

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SYPHILITIC THORACIC ANEURYSM IN YOUNG ADULTS

BY

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Syphilitic thoracic aneurysm rarely occurs in patients under the age of 30; only two of the 840 admitted to the London Hospital during the past forty-six years were below this age. These two, with a third which was recently under my care, are here described.

Case I

A man aged 29 was admitted to the London Hospital on January 16, 1899. Seven years previously he had contracted a penile chancre, and was treated with potassium iodide for seven months. For three months before admission he had complained of cough, increasing hoarseness, pain in both arms, and, later, of great difficulty in breathing.

On examination he was orthopnoeic, and inspiratory and expiratory stridor was present. His voice was hoarse, and he had a persistent croupy cough; both the vocal cords were completely paralysed. The right pupil was smaller than the left. There were "tissue paper" scars on both legs. The left pulse was stronger than the right. There were pulsation and dullness to percussion just below the right clavicle. The apex beat was in its normal position. The second sound in the aortic area was accentuated. A loud systolic murmur was heard near the right clavicle, but there was no mention of a diastolic murmur. Scattered rhonchi were heard in the lungs. The day after admission tracheotomy was performed without relief, and the patient died after four days. A clinical diagnosis of tracheal obstruction due to diffuse aneurysm of the aortic arch was made.

At necropsy the aorta was dilated from its origin, producing relative incompetence of the aortic valve, and it reached extreme dilatation two and a half inches above the valve, converting the whole of the arch into a large irregular aneurysm, with a thin wall in parts, and filled with laminated blood clot. Projecting from the main aneurysm were daughter aneurysms with small irregular openings of various sizes up to three-quarters of an inch in diameter. The right subclavian artery, right carotid artery, and both recurrent laryngeal nerves were pressed upon. The aneurysm compressed the trachea on the right side one and a half inches below the tracheotomy wound. There was diffuse bronchopneumonia of the lower lobes of both lungs. The heart weighed 22 oz. (625 grammes).

The macroscopic description of the aorta suggests an aneurysm due to aortitis rather than to mucous degeneration of the media, or to severe medial degeneration associated with atheroma.

Case II

A man aged 28 was admitted to the London Hospital on August 8, 1913. Eight years previously he had contracted syphilis and been treated for three months with injections. For six weeks before admission he had complained of shortness of breath on exertion, periodic attacks of severe coughing without expectoration, and a dull aching pain behind the sternum and in the left axilla that sometimes radiated down

the inner side of the left arm. The pain was occasionally sharp, and it passed through to the back and was increased by coughing. Three weeks before admission he had been very breathless and found that he could only sleep with his head on a table placed in front of him.

He was pale and orthopnoeic, and he coughed constantly. The pulse, which was rapid and regular, was not collapsing in character and it was equal on both sides. Pulsation was seen in the second and third rib spaces on the left side, and in this region there was impairment of the percussion note. The apex beat was diffuse. A systolic murmur was heard over the praecordium, loudest in the aortic and faintest in the mitral area. There were signs of emphysema, and crepitations were heard over both lung bases. There was oedema of both legs. No abnormal physical signs were detected in his abdomen or central nervous system. His chest was screened and a large pulsating aneurysm was found. His Wassermann reaction was positive. He developed dysphagia and, later, symptoms of heart failure, and died ten days after admission.

Summary of Necropsy: Congestive Heart Failure; Haemopericardium; Aneurysm of Aorta; Syphilitic Aortitis.—Conspicuous wrinkled white thickening of intima of ascending aorta and arch; one succulent intimal nodule in descending portion of arch. Slight atheroma; sparse fatty streaks in descending thoracic and abdominal aorta and coronary and carotid arteries. Very thin-walled saccular aneurysm, measuring 13 cm. from above down and 16 cm. from side to side, and arising by neck 6 cm. in diameter from the ascending and transverse portions of arch of aorta. Thick layer of laminated clot in sac. Compression by aneurysm of left main bronchus; slight compression of pulmonary stem; partial erosion of sternum. Slight hypertrophy of right ventricle (right ventricle 0.8 cm. thick, left 1.5 cm.) Leakage of aneurysm into pericardial sac; parietal and visceral pericardium covered with brown shaggy fibrin. Bilateral blood-stained pleural effusions (right 28 oz., left 48 oz.); slight bilateral fibrinous pleurisy; partial collapse of lower lobe of left lung. Mucous bronchitis. Congestion and oedema of lungs. Congestive atrophy of liver (4 lb. 1 oz.) causing paradoxical lobulation; slight cloudy swelling of liver. "Back-pressure" congestion of kidneys (11¾ oz.) and spleen (5 oz.). Congestion and slight mucous catarrh of stomach and intestines. Oedema of legs and feet. Scar on dorsal corona of glans penis. Well-nourished and well-developed man. Examination of head not permitted.

Case III

A woman aged 28 was admitted to the Essex County Hospital, Wanstead, on January 22, 1940. She married five years ago, and six months later began to complain of palpitation and choking in the throat, which was made worse by excitement and was relieved by sitting up. She had observed abnormal pulsation in the neck. About two years ago she became pregnant, and was admitted to a maternity home three months before term on account of "blood pressure and shortness of breath"; she had a normal delivery. This was the only pregnancy and there had been no miscarriages. For fifteen months there had been a gripping pain in the left submammary region, radiating to the back of the chest. The pain never passed into the back or arms. For six months she experienced throbbing in the head. There had been no dysphagia or aphonia. She denied venereal disease or any of the symptoms characteristic of secondary syphilis. She had had diphtheria at the age of 12, and subsequently was not allowed to play games at school. Her husband and child were healthy; her mother and sister were well and had had no miscarriages. Eighteen years ago her father left her mother and he could not be traced; he was thought to be healthy.

On examination there was capillary pulsation of her lips and conspicuous arterial pulsation in the neck with a systolic thrill over the carotid and subclavian arteries. The pulse was regular, a little rapid, and collapsing in character. The forcible apex beat was displaced one and a half inches beyond the mid-clavicular line. No thrill could be detected over the heart. The second sound in the aortic area could not be heard. All over the praecordium were heard systolic and diastolic murmurs. In the mitral area the systolic murmur was soft, though it was conducted to the left axilla. In the aortic area the systolic murmur was harsh and conducted to the neck. The soft aortic diastolic murmur was heard along both borders of the sternum. Blood-pressure readings were as follows: right arm, 200/40; left arm, 200/40; right leg, 230/40; left leg, 230/40. There were no abnormal physical signs in the lungs, abdomen, or central nervous system; and there was no evidence of congenital syphilis.

The Wassermann and Kahn reactions were strongly positive in the blood. The husband, baby, mother, and sister had negative reactions. In the cerebrospinal fluid there was no increase in protein or cells, the Wassermann reaction was negative, and the Lange curve was normal.

Cardioscopy showed considerable distension of the left ventricle and aneurysmal dilatation of the descending portion of

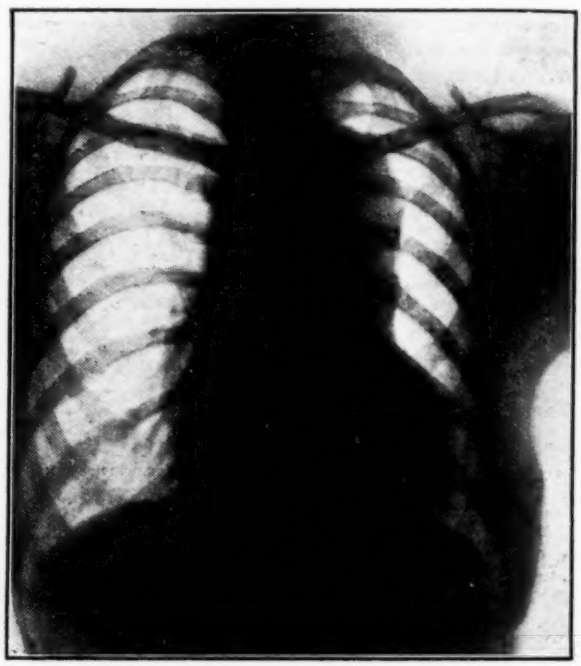

FIG. 1.—Teleradiograph of Case III.

FIG. 2.—Electrocardiogram in Case III.

the aortic arch and of the first moiety of the descending aorta. There was no visible dilatation of the ascending aorta. The lung fields were clear.

The accompanying radiograph (Fig. 1) shows the summit of the arch reaching above the level of the clavicle, and great widening of the vascular pedicle from dilatation of the arch and descending aorta. The heart is enlarged to the left.

The electrocardiogram (Fig. 2) shows slight prolongation of the P-R interval, deviation of the electrical axis to the left, slurring of the QRS complexes, and flattening of the T wave in Lead I.

Any paper on syphilitic aneurysm in young adults must necessarily deal with the incidence of aortitis in *congenital* syphilis, and give consideration to the latent period between the primary infection and the symptoms resulting

from aortitis in *acquired* syphilis. Further, the age incidence of thoracic aneurysm should be discussed.

Aortitis in Congenital Syphilis

Turnbull (1911) recorded two cases of syphilitic mesaortitis, the first in a girl aged 17 whose father suffered from a similar condition, and the second in a girl aged 7. At necropsy in both cases the macroscopic and microscopical descriptions were characteristic of syphilitic mesaortitis. There was no dilatation of the aorta. Clinically these patients did not show any of the stigmata of congenital syphilis, and the writer was not able to conclude that the lesions were of congenital origin. Heiman (1919) saw an aneurysm of the thoracic aorta in a boy aged 13 whose Wassermann reaction was strongly positive. This patient also had splenomegaly, and there was a suspicion of a gumma of the liver and Hutchinson's teeth. The mother had had two miscarriages and gave a positive Wassermann reaction. Stolkind (1920) after a careful survey of the literature could not find a single case of proved hereditary syphilitic aortitis in older children, and especially in adolescents and adults. Referring to a child aged 4 described by Willson (1914) as having an aneurysm, he stated that no process typical of syphilitic aortitis was found and that all the signs were inconclusive. Previtali and others (1930) in a series of 50 congenital syphilitics were unable to detect any evidence of aortic dilatation by clinical or radiological examinations. Givan (1930) failed to demonstrate syphilitic heart disease in 417 similar cases, whilst McCulloch (1930) concluded that congenital syphilis plays no part in cardiovascular disease in children up to the age of 15. McDonald (1932) described findings at necropsy in a boy aged 9 with congenital syphilitic mesaortitis whose father and mother were also syphilitics. The patient had interstitial keratitis and gave a positive Wassermann reaction. The aorta was examined microscopically, but no spirochaetes could be demonstrated. This writer concluded that definite clinical recognition of the condition is possible only in a few cases. Recently at the London Hospital 13 patients with congenital syphilis, whose ages ranged from 13 to 47, were examined clinically and by cardioscopy, and in none of them was there any evidence of aortitis.

It appears, therefore, that congenital mesaortitis can exist as a pathological lesion, but only rarely does it produce clinical or radiological evidence of an aneurysm.

The three cases described here do not belong to this group. In Cases I and II a history of primary infection was obtained; in the third case no stigmata of congenital syphilis were found, and the Wassermann reactions in both mother and sister were negative.

Onset of Aortitis in Acquired Syphilis

Sandford (1931) stated that in a series of 71 cases of thoracic aneurysm the average time interval between the initial lesion and the onset of symptoms was slightly over fifteen years. He found the shortest period between the primary sore and the earliest symptoms suggesting aneurysm to be two years and the longest fifty years. Coombs (1932) reviewed the literature and concluded that all observers were agreed that this interval was from fifteen to twenty-five years. Boyd (1924) studied 200 cases and gave this period as twenty years. Among 346 cases of cardiovascular syphilis Maynard and others (1935) found 190 in which the date of the primary lesion was known. About a quarter of these showed some evidence of cardiovascular disease within ten years, but the average for the series was twenty years. Evans (personal communication, 1935) examined 55 consecutive patients with acquired syphilis in whom the primary infection was known to be longer than five years. Examination was made clinically, electrocardiographically, and by cardioscopy. Aortic measurements were taken. Alteration in the aortic outline consequent on age or hypertension was considered when assessing the changes resulting from aortitis. In this series the aorta was judged to be normal in 25 patients and abnormal in 30. In 10 of the abnormals the aorta was altered as a result of hypertension or atheroma, and in 20 syphilis had produced the deformity. In relation to the primary infection aortitis was found in these 20 cases at intervals of 5 to 10 years in 1, 11 to 15 years in 4, 16 to 20 years in 5, 21 to 25 years in 4, 31 to 35 years in 4, 36 to 40 years in 1, and over 41 years in 1 case.

In the first two cases reported in this paper the interval between the primary lesion and the onset of symptoms was approximately 7½ years. In the third case the initial infection may have been acquired soon after puberty, and there is the possibility that the infection was extragenital and perhaps occurred in infancy.

It is clear that the usual latent period between the primary infection and the onset of cardiovascular symptoms in acquired syphilis is from fifteen to twenty years, but in a few cases the interval is less than ten years.

Age Incidence of Aneurysm

Many cases similar to those here described have been reported from time to time. As early as 1725 Morgagni (Kampmeier, 1938-9) did a post-mortem examination on a young woman aged 28. A small aneurysm was found half an inch above the aortic valve, which had ruptured into the pericardium. So exact is this first description of the morbid anatomical features of syphilitic aortitis that it merits recapitulation: "... that is to say, in some places whitish marks of a future ossification occurred; in others some small foramina, as it were, had begun to be formed; and in still other places were paralleled furrows drawn longitudinally—in this manner was the surface of the artery unequal here and there." In 1847 Crisp collected 12 cases under the age of 30. Le Boutillier (1903) reviewed the subject and discovered 18 cases under the age of 20 the aetiology of which was obscure. Richey (1923) after a detailed search of the literature found 41 cases under the age of 18, and remarked that only one of those presented definite evidence of syphilis. Brockbank (1925) analysed the records of 200 necropsies on cases of aortic aneurysm and found that 7.5% were between the ages of 21 and 31. Recently Kampmeier (1938-9) in a series of 633 cases of thoracic aneurysm found 9 (7 negro males; 1 white male; 1 negro female) under the age of 25.

Table showing Age and Sex Incidence in 840 Cases of Thoracic Aneurysm Admitted to the London Hospital 1893 to 1939

Age	Males	Females	Total
0–9	0	0	0
10–19	0	0	0
20–29	2	0	2
30–39	115	15	130
40–49	230	35	265
50–59	262	40	302
60–69	104	20	124
70–79	12	5	17
80–89	0	0	0

Authors vary as to the period of maximum age incidence of thoracic aneurysm. Lucke and Rea (1923) concluded that this period was 35 to 55, and Boyd (1924) from the investigation of 3,690 cases gave the age incidence as 36 to 40. Kampmeier (1935) stated that the highest incidence was between the ages of 45 and 55, and Cochems and Kemp (1937) in a study of 1,000 syphilitic individuals found 47 aneurysms, 39 of which occurred after the age of 50. The accompanying table compiled from the London Hospital in-patient records shows that the highest peak of incidence was

50 to 59, a somewhat higher figure than is commonly quoted. In this series it is of interest that no female patients with thoracic aneurysm were found under the age of 30.

Summary

Two cases of acquired syphilitic aneurysm in adults under the age of 30 are reported. It is probable that the disease was also acquired in the third case. Although congenital syphilitic mesaortitis does occur the incidence of aneurysmal dilatation is very rare. It is known that symptoms of thoracic aneurysm may appear within ten years of the primary syphilitic infection, but in the majority the period is fifteen to twenty years. As regards age incidence of aneurysm of the thoracic aorta, the maximum was found in the sixth decade.

My thanks are due to Dr. John Parkinson, physician to the cardiac department of the London Hospital, and to Dr. William Evans, the assistant physician, for their interest and advice; and also to the medical superintendent of Essex County Hospital, Wanstead, for his permission to publish Case III. The pathological description in Case II was kindly furnished by Prof. Hubert M. Turnbull.

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NOTE ON THE TESTING OF TRANSFUSION FLUIDS FOR CONTAMINATION

BY

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It is ideal that all bottles of plasma and of citrated blood used for transfusion should have been tested for sterility, but it is also ideal that no bottles should be opened before use. These ideals are in conflict. If each bottle is to be tested it is necessary that the ritual is such as to eliminate any possibility of contamination of the material in the course of the bacteriological examination.

Technique

The technique used in this laboratory for the testing of transfusion material sent for this purpose from the Edinburgh Blood Bank is as follows.

All currents of air in the room are avoided. There is no speaking while the bottles are opened. No bottles are opened if anyone has recently sneezed or coughed near the bench. When a crate of, say, six bottles of plasma or blood is received, six tubes of ordinary or trypsin broth for aerobes and six tubes of Robertson's meat medium sealed with paraffin for anaerobes are set out in a rack and labelled. The cotton-wool plug in each tube is freed by turning, to ensure that it can later be removed with one hand. The bottle is placed near to the rack and the rubber bung or screw cap removed with one hand while a Bunsen flame is played with the other on the upper rim of the bottle and air immediately above, into the upper inch or so of the aperture, and inside the screw cap or around the part of the bung which is to be inserted. The bung or cap is then replaced, but without ramming home or screwing down. A sterile Pasteur pipette is removed from the copper box in which it has been sterilized, a rubber teat affixed, and the part of the pipette which is to be introduced sterilized once more by passing through the Bunsen flame. The bung or cap is now momentarily removed and about 1 c.cm. of plasma or blood drawn into the pipette, the stopper being lightly replaced. Each culture tube in turn is then lifted between the thumb and ring and little fingers of the left hand, the cotton-wool plug is withdrawn between the index and middle fingers, the medium inoculated with half the pipetteful of fluid, and the plug replaced. In inoculating the anaerobic medium it is important that the pipette be withdrawn before all the fluid has been expelled, to avoid the introduction of air into the medium. The pipette is then discarded into a vessel containing antiseptic, and, with both hands now free, the bung or cap is again lifted and the ritual of flaming the lip and mouth of the bottle and the stopper carried through once more. Bung or cap is now screwed firmly home. All this takes only a few seconds.

The inoculation tubes are incubated at 37° C. for two days. If they remain perfectly clear the result is reported as negative. If there is any trace of turbidity, films and subcultures are made. Sometimes there is a slight change in the Robertson's medium which entails further examination when actually no organisms are present. It will be observed that while most varieties of organisms are catered for by the media used, which are enriched by the plasma or red cells introduced, there is no provision for the growth of haemophilic organisms when the material under examination is plasma. But as such organisms could not multiply in the original bottle of plasma even if accidentally introduced, it has not been thought necessary to use a blood medium.

Precautionary Measures

Strict injunctions are given that no one is to open a bottle except the person carrying out the examination. There is a very real danger here, as blood and plasma are both used in bacteriological laboratories for the preparation of media, and the latter for the coagulase test on staphylococci. If the Blood Bank gives an occasional present of blood to the examining laboratory it makes for additional safety in this respect. Where bottles have to be sent some distance to an outside laboratory it is advisable to seal them before sending, and before returning, in such a way as to make it obvious if they have been tampered with. Instructions are given to the messenger to shake bottles of blood as little as possible during transport.

Before being sent from the Blood Bank for testing, the bottles should be removed from the refrigerator and kept at room temperature for several days so as to give contaminations an opportunity of multiplying.

The technique above described has given satisfactory results, and can be carried through by one person. In no case, so far as can be ascertained, has it been the cause of contamination of a bottle, or failed to detect one when present.

The following notice appeared in the *New England Journal of Medicine* for February 27: "It will help England greatly in the care of victims of bombing raids and help England prepare for the coming invasion if physicians in this country all give discarded or superfluous surgical instruments or surgical dressings. Any such material should be sent to the Medical and Surgical Supply Committee, 420, Lexington Avenue, New York City."

Medical Memoranda

Unusual Dislocation of the Carpal Bones

It is thought that the following case is worthy of record owing to its unusual character.

CASE REPORT

A soldier aged 21 came to hospital on the morning of December 10, 1940, complaining of pain in his right wrist. Earlier that morning a lorry, whilst backing, had compressed his right hand and forearm against a wall. The elbow was flexed at the time so that the force was an impacting one, tending to drive the carpus proximally.

On examination there was considerable radial deviation of the wrist, and the lower end of the ulna was very prominent. Any attempt to move the wrist passively caused great pain.

FIG. 1.—Radiograph showing gross dislocation of the carpal bones and fracture of the scaphoid.

A radiograph (Fig. 1) showed a gross dislocation of the carpal bones, with a fracture of the scaphoid. The only bones remaining in the correct anatomical position were the semilunar and the proximal third of the fractured scaphoid. The

FIG. 2.—Radiograph showing the position after reduction.

others, including the distal two-thirds of the scaphoid, were displaced upwards, backwards, and towards the radial side of the wrist. The cuneiform was occupying the normal site of the scaphoid and was overlying the proximal fragment of the latter. Thus the appearance was that of a "trans-naviculo-perilunar dislocation" as described by Böhler (1935).

The dislocation was reduced under general anaesthesia. A calico bandage was passed round the arm for counteraction and the elbow was flexed to a right-angle. Strong traction was then exerted on the wrist for about ten to fifteen minutes; the carpal bones were also slightly manipulated. A second radiograph (Fig. 2) showed that the position after reduction was satisfactory. A volar plaster slab was then applied with the wrist dorsiflexed, and the patient was admitted to the fracture ward. A few days later a plaster bandage was applied to complete the plaster. He was discharged in plaster on December 23, his finger and thumb movements being very good.

On January 1, 1941, the plaster was removed and the wrist radiographed. It was thought that his scaphoid showed signs of commencing union, and he seemed to be doing very well. Another plaster was applied.

I wish to thank Mr. W. Harvey Gervis, surgeon in charge of the fracture clinic, Kent and Sussex Hospital, Tunbridge Wells, for permission to publish this case and for his help and advice.

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Lobectomy for Bronchiectasis in an Infant

The following report of a case of bronchiectasis in a young child treated by lobectomy has some features of interest.

CASE REPORT

The patient, a female child aged 19 months, was a twin weighing 4 lb. 5 oz. at birth; her twin brother weighed just over 5 lb. Up to the age of 6 months she was healthy, but remained under weight. She then developed a "cold" and ever since has coughed up offensive sputum which made her sick as many as five or six times a day. She had a chronic nasal discharge, was always listless, took little interest in her surroundings, and became pigeon-chested.

On examination the left lower lobe of the lung was seen to be the seat of the trouble. There was pronounced clubbing of the fingers and the temperature was raised and very irregular. The motions were offensive, and there was constipation. Owing to the poor condition of the child no bronchogram was taken, but postural treatment was tried, with little success, for two months. On September 12, 1940, a bronchogram showed considerable bronchiectasis of the left lower lobe, with large numbers of saccular dilatations. On November 16 the child was transferred to one of my beds at the Sheffield Royal Infirmary, and, after some pre-operative treatment, an operation was performed on November 21. A preliminary attempted artificial pneumothorax revealed that the lung was adherent, so that it was possible to perform the operation of lobectomy without further treatment.

The chest was opened by the usual incision in the sixth intercostal space and the lung separated from the thoracic wall. The roof was defined and clamped with a tourniquet, and the lung removed. The cavity left was drained under "automatic suction" drainage. There were no post-operative complications, and on December 9 the child was sent back to the Children's Hospital to complete her convalescence.

Pathological examination of the excised lung showed extensive saccular bronchiectasis, the cavities for the most part being filled with pus. It is probable that the lobe was of the congenital cystic variety and became infected at the age of 6 months. As the lipiodol did not fill the upper lobe it is not possible to say whether there were saccular dilatations in it or not.

After her return to the Children's Hospital she developed chicken-pox, and shortly after recovering from this she had measles, but in spite of all her troubles she was very well when seen at the end of January, 1941. She was then quite a different child; she played with toys, was cheerful, and had a good appetite and a good colour.

I am unaware of any case in which a lobectomy has been performed at such an early age, though I expect there are some.

Sheffield. A. W. FAWCETT, F.R.C.S.

Reviews

RADIOLOGY OF HEAD AND NECK

The Head and Neck in Roentgen Diagnosis. By Henry K. Pancoast, M.D., Eugene P. Pendergrass, M.D., and J. Parsons Schaeffer, M.D., Ph.D. (Pp. 976; 1,251 illustrations. 63s.) London: Baillière, Tindall and Cox.

To ensure that the criticisms which follow are read in proper perspective, let it first be stated that *The Head and Neck in Roentgen Diagnosis*, by such a distinguished team as H. K. Pancoast, E. P. Pendergrass, and J. P. Schaeffer, is a book of first importance to radiologists. It is a large book, of 976 pages and 1,251 illustrations, and, as may be deduced from its title, is designed in unusual form. This arbitrary division of the subject through the root of the neck leads to some difficulties. For instance, in many bone diseases the authors are driven beyond the limits imposed by the title in order to give a reasonable description of the condition as a whole. Again, the upper part of the trachea and oesophagus and the lung apices fall within the ambit of the book, but not the superior mediastinum or the rest of the lungs. This format has, however, one great advantage. It presents, collected in one volume, a mass of information for reference in cases in which the lesion is manifestly located in the head or neck.

In the preface the authors state their aim to be to correlate radiology "with the apposite facts in developmental and adult morphology, physiology, pathology, and observations in clinical medicine and surgery and the special branches." The turgidity of this phrase can be matched by much of the writing of the book. Indeed, throughout the whole book there is a prolixity that makes the reader long for the use of the terse phrase and the simple word. One feature that will strike him is the detailed nature of the anatomical descriptions. Often these are of the greatest value, and give data not readily available elsewhere. Here and there they are redundant, as on page 22—"From each alveolus, projecting downwards, are the upper teeth. In apposition with the upper teeth are the lower teeth, which project upwards from the alveolar process of the mandible." Again, on page 55, "The oral cavity is largely obscured by the teeth, which project downwards and upwards from the upper and lower jaws respectively." Resolute pruning would reduce the size of a second edition and add to its usefulness.

The first four chapters deal with the anatomy of the skull, fractures and other bone lesions, and tumours of the scalp, skull, and spine. These are generally excellent, but one or two minor points might be corrected—for example, the term "desiccation necrosis" on page 165 (dissecting necrosis?), and the statement that Ewing's tumour of long bones has no characteristic *x*-ray appearance. The term "increased radiability" on page 267 is not a happy one. The section on the teeth is very good, and especially the anatomical description. The chapters on the nose, lacrimal apparatus, sinuses, and temporal bones occupy 170 pages and are particularly well done. The description of intracranial tumours and cerebral pneumography takes up 230 pages, and is the most important section of the book. It is an admirably complete account of the subject. The last section, on the neck, deals with such varied subjects as the pharynx, larynx, trachea, oesophagus, cervical pleura, the thyroid and other glands, and, finally, the cervical part of the spinal cord.

In conclusion, there is a wealth of information in these pages, and as a book of reference it is invaluable. The authors deserve congratulation on producing a work of outstanding merit, and one which is recommended to all diagnostic radiologists.

ADVANCES IN FOOD CANNING

Canning Practice and Control. By Osman Jones, F.I.C., and T. W. Jones, B.Sc. Second edition. Revised and enlarged. (Pp. 312. 32s. net.) London: Chapman and Hall, Ltd. 1941.

The second edition of *Canning Practice and Control*, by O. and T. W. Jones, which appears within three years of the first, has been enlarged to keep pace with recent advances. One of these is "high short" processing, in which high temperatures are applied for short periods. According to the heat penetrability of the food treated the periods may range from a few seconds upwards. The shorter the time the better is the quality of the finished article. Fruit juices can be flash-pasteurized at lower temperatures than most foods, since the bacteria which they contain are feebly heat-resistant. A new chapter is devoted to the packing of foods in glass. The heavy-calibre glassware necessary is subject to stresses during heating. Faults in fresh consignments may be thrown into prominence by means of a "strain-viewer," using polarized light. Specially annealed glass is relatively heat-proof, but the general tendency in the processing of foodstuffs put up in glass is to employ a moderate temperature and give a longer exposure. Another new section is that upon the thermophilic bacteria. It is said that these organisms are less likely to cause spoilage in foods canned for the home market than in those exported to the Tropics, the reason being that home air temperatures are seldom high enough to favour the vegetative development of thermophil spores. It is believed that sugar and starch are the principal vehicles for the introduction of these germs into canning factories. The book is handsomely produced and copiously illustrated. It is, like its predecessor, a valuable and instructive guide to the principles and procedure of the important industry with which it deals.

SKIN HYPERSENSITIVENESS

Dermatologic Allergy. An Introduction in the Form of a Series of Lectures. By Marion B. Sulzberger, M.D. (Pp. 540; 13 colour plates, 39 illustrations. 47s. or $8.50 post paid.) Springfield and Baltimore: Charles C. Thomas; London: Baillière, Tindall and Cox. 1940.

Dr. Sulzberger is certainly one of the most prolific and industrious writers on dermatology at the present time. No fewer than three fat volumes are credited to him (it is true not without collaborators) within a single year, and the one now before us is the fattest. This is not surprising in view of the immense field included in the term "allergy." It may not be generally remembered that the word was originally coined by von Pirquet in 1906 to express the phenomena of hypersensitiveness in animals artificially immunized against various diseases, and Sulzberger has done a service to the modern generation by reprinting in this book a translation of von Pirquet's original paper. But the applications of the term have gradually been extended, and the present author defines it as any specific alteration in the capacity to react which occurs in living organisms or tissues upon exposure to either living or inanimate agents or substances. Hence there is exceedingly little difference between allergy and hypersensitiveness, and we are still unable to understand why it was necessary to coin this new word. Sulzberger thinks differently, but we do not think he puts up a very strong case.

However, the term "allergy" has undoubtedly established itself and has come to stay. It will be seen that in its comprehensive sense it includes pretty well every manifestation or symptom of disease which can be found on the skin. Not only are serum eruptions and urticarial rashes to be regarded as manifestations of allergy, but all the

exanthemata, the rashes of syphilis, the various forms of tuberculous disease, drug eruptions, and in fact every variety of skin eruption for which the proximate cause or agent is known is described as allergic to that agent. So the chief skin diseases which are not yet included among the allergic states are psoriasis and lichen planus, simply because we do not know their aetiology; and, when we do, no doubt they too will be considered as manifestations of allergy. There is therefore no reason to be surprised at the size of Sulzberger's treatise on the subject, and we hasten to add that it is a mine of information. There is also a chapter on the future probable or possible developments of the subject. He thinks that improvements in present methods may lead to specific prophylactic measures in many diseases with the same success that has already been attained in small-pox and diphtheria, also that non-specific measures may help by preventing the occurrence of damaging forms of specific reactions by fortifying the constitutional defences by all sorts of different means, such as diet, elimination of septic foci, administration of hormones, regulation of electrolytes, etc. In other words, he thinks that there is a great future for preventive measures in medicine. We fancy that the same conclusion might have been arrived at more simply.

Perhaps the chief value of this book is that it gives so full a summary of all the work that has been done on skin-hypersensitiveness for the last thirty years, and the classificatory tables and lists of tests and of various antigens will be found most useful. Like most American publications, the book is excellently got up and the printing, paper, and illustrations are above reproach.

CHEMOTHERAPY OF BACTERIAL INFECTIONS

Essentials of Modern Chemotherapy. By Various Authors. Edited by Sir Humphry Rolleston, Bt., G.C.V.O., M.D., F.R.C.P., and Alan A. Moncrieff, M.D., F.R.C.P. "The Practitioner" Booklets. (Pp. 104. 6s.) Published by "The Practitioner" in conjunction with Eyre and Spottiswoode, Ltd.

A series of papers which appeared in the *Practitioner* in January, 1940, on treatment with sulphonamide compounds has now been published in the form of a small book entitled *Essentials of Modern Chemotherapy*, a somewhat more comprehensive title than its contents justify, since it deals with no other forms of chemotherapy than those recently introduced for the treatment of bacterial infections. The authors of these papers have revised them in the light of fresh knowledge acquired during the past year, and they afford a useful practical guide to the treatment of streptococcal, pneumococcal, gonococcal, and meningococcal infections. There is also a chapter on chemotherapy in the acute specific fevers and a new one on the use of sulphathiazole in staphylococcal infections. In a work so arranged, and of comparatively small size, other and less generally familiar aspects of the subject are naturally less fully dealt with; the treatment of gas gangrene and the local application of sulphonamides to wounds, for instance, are mentioned only in an appendix which briefly conveys the instructions on these subjects issued in official memoranda since the outbreak of war. A chapter on the treatment of urinary infections might usefully be added in any future edition.

Notes on Books

Professor WILLIAM BOYD'S *Pathology of Internal Diseases*, the third edition of which has appeared (Henry Kimpton, 45s.), is a deservedly popular book, attractive by reason of both its lavish illustration and engaging style. The picturesque touch is freely used to interest the student and leave a vivid impression on his mind: this is achieved both by choice of language and by the citation of extreme cases, such as the silicotic lung which had to be cut with a saw. Many subects have been rewritten in this edition or discussed for the first time. These changes as a whole add much to the value of the book, although individually some of them occupy little space; extrarenal uraemia, for instance, makes its appearance with a paragraph of only eight lines, which might well be amplified considerably. The close relation between pathology and clinical medicine for which the author has always striven is sustained not only throughout the text but by numerous photographs of patients, illustrating such features of disease as deformities of various kinds and abnormal gaits.

The innovations in the third edition of L. C. PETER'S book on *The Extra-ocular Muscles* largely concern orthoptic training for squint, of which a cautious but useful assessment is given. The chapter on nystagmus has been expanded, but still remains a rather confusing mass of isolated details. The volume is published by Henry Kimpton at 21s.

Preparations and Appliances

EFFICIENT SULPHANILAMIDE INSUFFLATION

Dr. A. R. HODGSON writes from the Norfolk and Norwich Hospital:

In the treatment of compound fractures and extensive muscle lacerations, few can doubt that the use of sulphanilamide powder locally prevents much sepsis. Of the methods of applying the powder, opinion is unanimous that insufflation is the best. It ensures an even film of powder over the damaged tissues, resulting in maximum adsorption and thorough penetration.

In the Orthopaedic Department here we have been using the Evans Sons Lescher and Webb insufflator, which gives a very fine and intermittent spray. This spray has been found to be too fine, and not of sufficient penetrative power for compound fractures and severe muscle lacerations. A far greater, and if possible continuous, positive pressure is needed to produce an adequate flow of sulphanilamide powder.

This has been achieved by using an oxygen or carbon dioxide cylinder as a source of positive pressure. The apparatus is fitted up as follows. A four-foot length of pressure rubber tubing is connected up from the cylinder to the insufflator. A cylinder with both fine and coarse adjustments should be used. A further length of sterile rubber pressure tubing is fitted from the insufflator to the wound; generally about nine feet is sufficient. A glass nozzle may be fitted to the free end of the sterile tubing. The coarse adjustment of the cylinder is turned on. The fine adjustment is then turned on slowly until a fine spray is obtained. The nozzle is now turned towards the wound and held about two inches from it. The sulphanilamide powder forms a "frost" over the damaged tissues. When all the wound is covered by this "frost" of powder the cylinder is turned off. The positive pressure can be regulated, giving a variable sulphanilamide spray with varying penetrative power. This method has been found to be both simple and effective by those who have used it.

No toxic manifestations of any severity have been observed from the local application of sulphanilamide. Amounts far in excess of the recommended dose of 15 grammes have been given with no ill effects. In some cases of severe multiple injuries doses of 50 to 60 grammes have been given. The dose is that amount needed to cover the injured tissues with a "frost" of powder. When large amounts are used the breath has an odour of garlic. Slight cyanosis may occur with massive doses. In only two cases have I seen a sulphonamide rash; they were both having 1 gramme sulphanilamide orally, four-hourly, in addition. The rash disappeared within forty-eight hours of stopping the oral sulphanilamide. No case showed a pathological decrease of the white blood cell count.

Care should be taken when insufflating small penetrating wounds, such as those due to bomb fragments. Excessive pressure will strip the superficial fascia from the deep fascia, and balloon up the skin. No harm has come from the introduction of either oxygen or carbon dioxide into the wounds; they may have a beneficial effect.

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DYSPEPSIA AND CARDIOVASCULAR NEUROSES IN WARTIME

This war has so far produced no new diseases and the number of physical and psychological casualties from total warfare has been far smaller than was anticipated. The two disorders which have attracted most attention are peptic ulcer and effort syndrome, and here there has been no change in incidence and severity, but merely a shift in outlook and perspective. The physician who has been so fortunate as to work at a hospital which serves a fair sample of the population, and which has the resources to investigate its cases fully, knows that peptic ulcer is a common cause of dyspepsia. The pathologist of such an institution finds not only the scars of ulcers but unhealed craters in a surprisingly high proportion of subjects whose notes in many cases bear no record of treatment for indigestion. When men suffer from peptic ulcer in civil life they are enabled to carry on by readjustments of diet and by occasional periods off work, which in cases of declared ulcer average about a month every year. Such forms of adaptation are rarely compatible with combatant service, and the presence of an ulcer therefore means the rejection or discharge of a man from the fighting Services unless he is possessed of very special experience or gifts to outweigh his disability. The physician trained in civil practice has been slower to recognize a type of dyspepsia, familiar to the Army doctor, which occurs in young men who pass abruptly from a sedentary to a strenuous existence and suddenly double or treble their food intake. This is a transient disturbance, comparable with the belly-ache of the school-boy who overeats, and it is in the highest degree undesirable that such patients should be submitted to a full-dress gastro-enterological investigation. Such a practice is known to create invalids, whereas the dyspepsia can be simply relieved by a few words of advice and reassurance. There is therefore nothing very mysterious or specific to this war in dyspepsia in soldiers, and the most important conclusion to be drawn is that our facilities for the diagnosis of ulcer in peacetime and our methods of treatment are still very unsatisfactory.

The physician in hospital practice in civil life has also been seeing in recent years an increasing number of patients, mainly females, who are referred for investigation on a suspicion of thyrotoxicosis, which proves not to be present. These cases, according to the order of presentation of symptoms and his individual bias, he diagnoses as cardiovascular neurosis, neuro-circulatory asthenia, vasomotor instability, or anxiety state. Spence[1] pointed out that, although such patients show tachycardia, the sleeping pulse rate may be normal, the typical exophthalmos, tremor, and fidgetiness of Graves's disease are absent, and there is often a history of nervous breakdowns in the past or of having always been delicate; the symptoms may have been precipitated by a period of mental stress, anxiety, or overwork. The cardiologist, too, knows these patients well, and Bourne[2] described a group of them, in whom the presenting symptom was inframammary pain, under the somewhat unfortunate title of " angina innocens " in our columns a few years ago. Bourne pointed out that the pain differs from that of organic heart disease not only in its location but in several other characteristics. The pain has no quantitative relation to exercise and is chiefly noticed after the exertion has ceased, when it may persist for some hours. It can also be produced or accentuated by excitement, and in a few cases it is followed by a feeling of faintness or actual fainting. When the presenting symptom is dyspnoea on exertion the disturbance is referred to as effort syndrome. Paul Wood,[3] whose Goulstonian lectures we have had the privilege of publishing, disagrees with this name on the ground that the symptoms are those of fear and anxiety, not of effort, and he uses the eponymic diagnosis of Da Costa's syndrome. We would prefer to follow the Standard Classified Nomenclature of Disease and include the various conditions mentioned under the comprehensive title of " cardiovascular neurosis." Whatever the divergence in nomenclature, there is general agreement about the facts, and our knowledge is not only ably reviewed but also extended and systematized in Paul Wood's lectures.

Cardiovascular neurosis is not a wartime disease, and it is more common in females than in males. It becomes apparently more frequent in wartime because sufferers tend to seek a sheltered existence, and it is only when they are called upon to bear the full heat and burden of the day that they become casualties. Wood believes that the condition arises when the emotion of fear becomes attached to the idea of exertion. A boy's first symptoms may occur during a game of football, when he is afraid of bodily hurt, and subsequent exertion evokes the same symptoms of dyspnoea, palpitation, and prostration to which this first fear gave rise. The fears and the symptoms are often perpetuated by the parents. It is as disastrous for a child to grow up in a neurotic home as in a tuberculous one, and a good deal might be said in favour of a Grancher system to protect children from the familial contagion of neurosis. The psychological background of effort syndrome has been explored by Wittkower, Rodger, and Wilson,[4] who believe that in all cases the syndrome is antedated by a character disorder. A fairly high proportion of their patients were over-conscientious and over-scrupulous, qualities which had made them useful members of the community in peacetime, but there was a general lack of toughness and joy in living which ill fitted them for the rigours of camp life and the battlefield. Among precipitating factors emotional disturbances were commonest and were of a type to which the patient had been previously sensitized. Other factors were over-exertion and febrile illness, most commonly a respiratory infection. Caughey[5] has emphasized the importance of convalescence from acute illness in the

[1] *St. Bart's Hosp. J.*, 1936, **44**, 9.

[2] *British Medical Journal*, 1937, **1**, 695.

[3] Ibid., 1941, **1**, 767, 845.

[4] *Lancet*, 1941, **1**, 531.

[5] *The Practitioner's Library of Medicine and Surgery*, New York, 1931, p. 3.

development of psychosomatic disorders. In addition to the physical effects of the disease process and the inherent recuperative powers of the organism, the convalescent period is complicated by the subconscious effects of the care and attention lavished upon the sick person, and the problem of his real desire to return to an active struggle against the forces of his environment. In the last war Bridgman[6] made careful estimations of the time required after various illnesses before the soldier was fit for full military duty. The average interval was 31 days after influenza, 34 days after tonsillitis, 58 days after pneumonia, 77 days after scarlet fever, and 50 days after herniotomy. These are much longer periods than the average medical practitioner would probably have suggested, and they emphasize the importance of intelligent medical supervision and military discipline if the soldier is to be completely cured and returned to the fighting line as promptly as possible. The physician must both realize the need for a period of rehabilitation and at the same time take pains to avoid any suggestion of cardiac disease.

The diagnosis of effort syndrome is based on the frequent occurrence of neurosis in the family history and previous history, and the characteristic symptoms of breathlessness, palpitations, fatigue, sweats, nervousness, dizziness, and left thoracic pain. Important signs are the anxious appearance, the cold blue hands, the instability of the pulse, blood pressure, and respiration, the inability to hold the breath, the sweating on the palms, and the poor physical development and asthenic posture. Symptoms are rarely if ever confined to exertion. They may occur at any time of the day or night and they are invariably evoked by emotion. Moreover, the individual symptoms are unlike those of heart disease. The dyspnoea is a rapid shallow breathing or inability to obtain a satisfying breath, and the sweating is confined to the palms of the hands and the axillae. Paul Wood has made an experimental study of the inframammary pain and produces good evidence that it arises in the muscular or fibrous tissues there, most commonly as a result of fatigue or strain of the respiratory muscles from the disordered breathing; a number of additional factors determine its localization to the left side. Secondary constellations of symptoms may group themselves around the main symptom-complex, and the hyperventilation syndrome is not uncommonly observed. In differential diagnosis it is to be remembered that a cardiovascular neurosis may be superimposed on an organic lesion of the heart, such as early mitral stenosis, which in itself should be symptomless. The prognosis depends largely on the personal and family history and the number of abnormal signs present: in any event it is poor. Few men with a personal and family history of neurosis or effort syndrome will make good soldiers, and, like those with a history of peptic ulcer, they should not be enlisted. Nevertheless the syndrome can be induced in adult life, and the battalion medical officer must be watchful to nip such cases in the bud. When a man complains of cardiac symptoms due to excitement, terror, or suppressed emotion, the medical officer must have the courage to say explicitly that there is no cardiac disease and the symptoms are natural and transient emotional responses. Some of the younger medical officers who come straight from hospital show a regrettable inability to take a careful family and personal history or to make a clinical diagnosis without a second opinion or elaborate special investigations. The place to prevent psychological casualties is in the front line, and the methods are those of general practice rather than the hospital ward.

[6] *Arch. intern. Med.*, 1919, **24**, 65

THE A.M.A. CONSPIRACY TRIAL

The long trial for conspiracy of the American Medical Association, along with certain other medical bodies and eighteen responsible officials, ended on April 4 with the somewhat illogical verdict of "Guilty" against the A.M.A. and three other bodies, and "Not Guilty" against the individuals. A Federal statute called the Sherman Act prohibits combinations or conspiracies in restraint of trade in the District of Columbia. Strangely enough, for the purpose of this Act the practice of medicine is trade, but carpentry and, by inference, other industries are not. A company called "Group Health Association Incorporated" was formed to provide medical services on a flat-rate prepayment basis, employing salaried practitioners. The policy of the A.M.A. is that doctors should be paid fees for service. Accordingly the Association and certain other bodies connected or in sympathy with it organized a campaign against the Group Health company. In the course of this they threatened such of their members as should become members of the staff of Group Health, or who should consult with members of its staff, with disciplinary action; and induced hospitals to deny facilities to medical practitioners employed by Group Health. The United States Government prosecuted them under the Sherman Act, alleging that their campaign constituted a criminal conspiracy.

As Associate-Justice James M. Proctor explained to the jury in his summing-up,[1] a conspiracy is committed when two or more persons combine to do an unlawful thing, or to do a lawful thing by unlawful means. It is not essential that all details of the plan be specifically arranged, or that the particular acts of each conspirator be definitely assigned; it is enough if there has been a meeting of minds for concerted action to gain the common end. All need not know each other or meet together at any one time, nor need all combine at the start of the conspiracy. Membership of the defendant medical societies, presence at their meetings, or knowledge of an unlawful plan would not alone make a person a participant: he must also have a positive intention to give adherence and support to the criminal scheme. The case for the Government was, he said, that the medical societies were opposed to Group Health and its plan, that they feared competition by the fixed-prepayment method of practice as against the free-for-service method, and that to obstruct and destroy such competition they conspired to impose restraints on medical practitioners affiliated with Group Health by threats of expulsion, by denying them professional contacts and consultations with other practitioners, and that the medical societies were opposed to Group Health doctors facilities for treating their patients. This plan, the prosecution said, was carried out by enforcing compliance with a statement known as the Mundt resolu-

[1] *J. Amer. med. Ass.*, April 12, 1941, p. 1700.

tion of the A.M.A. (which set out the position, the Association's attitude towards it, and the methods proposed to deal with it), implemented by a "white list" and aided by corporate and individual acts of the defendants. On the other hand, the defendants contended that there was no purpose or plan to restrain Group Health, the hospitals or doctors; that their acts were intended only to oppose Group Health by legitimate argument and persuasion; that no coercion was practised or intended against the hospitals; and that the "white list" and disciplinary proceedings against members represented reasonable action taken by authority to protect the organization and its standards of medical practice; and that if those actions interfered with Group Health and its doctors the effect was an incidental and indirect result of acts done legally and in good faith for legitimate ends.

The learned judge pointed out that reasonable discipline and control of members of a society are essential, but they cannot be justified where the real purpose or the natural results of their exercise are to interfere with free competition. Refusal to consult with particular physicians is not in itself illegal, but it may be illegal if done in furtherance of a conspiracy. A doctor may refuse to treat patients in a particular hospital, but if a group of doctors carrying out a concerted scheme refused to treat patients in order to injure the business of the hospital they would act illegally. The defendants were not entitled to oppose Group Health in a manner intended to restrain its operation, but they had the right of legitimate criticism, argument, and persuasion, however persistent and severe, either separately or by collective effort; if such opposition did not take the form of a conspiracy to restrain, it did not violate the statute. Similarly, the "white list" and the Mundt resolution were not wrongful in themselves, but only if perverted to advance the aims of a conspiracy. The same law applies to the action of hospitals in withholding privileges from certain practitioners.

The conviction of the corporations with the acquittal of the individual members directing them has naturally puzzled critics throughout the whole of the United States, and possibly elsewhere. In this country a corporation cannot be charged with a crime, and such a prosecution would have had to be brought only against individuals. The acts alleged against the defendants in this case could not be made the basis of a criminal prosecution here, though they might form ground for a civil action. The history of the British Medical Association does in fact contain, a generation ago, a civil action of this kind. However inconsistent the decision of the American jury may appear, it seems to have decided practical advantages. The *Washington Post* remarks (April 6) that the effect of the verdict is to stop the A.M.A. and the associated societies from interfering with the Group Health Association or other group practice enterprises which may fill a social need in present times. On the other hand, the verdict leaves no reflection upon the well-known medical practitioners and officials who were indicted for conspiracy, and recognizes that they had no intention of acting illegally. The finding may yet be reversed on appeal, and so the position cannot now be regarded as settled. The Sherman Law may possibly have to be reconsidered before the case is finally decided.

DESTRUCTION AT THE ROYAL COLLEGE OF SURGEONS

We are glad to supplement last week's article published at page 830 under the above heading and make certain corrections. Much further information is now available which the medical profession will wish to have at the earliest moment. With regard to the pictures and the Library, which were scarcely mentioned in our report, all the College portraits, except a very few having little artistic or historical interest, were sent away before the outbreak of war. Nearly 90,000 volumes from the Library have been sent to various parts of the country, the transfer being aided by a generous grant from the Rockefeller Foundation. The only books now standing on the shelves are standard textbooks; these and some current periodicals have been kept for reference. The principal treasures of the Library had been sent away before the outbreak of war, and none of the books remaining at Lincoln's Inn Fields has suffered damage in air raids In addition to the specimens which were reported last week as safe, we are happy to learn of many others that escaped. The basement of the College covers a very wide area, and not more than one-fifth of it was involved in the fire. Many rooms and a number of cellars in which specimens were placed for safety were unaffected. The more important specimens had been taken to a tunnel below the basement and surrounded by sand; others were placed in branches from this tunnel. Some of the tunnels, already very strong, had been specially reinforced. All the specimens in the main tunnel and the majority of those in the branches were saved from destruction. The important College records and historical documents had been sent away. Only the working records dealing with the distribution of those specimens which had been placed in the basement and sub-basement for safety, and the records of pathological specimens presented to the College during the last few years, were destroyed. The preservation of copies of the Museum catalogues had been carefully considered and appropriate steps taken. All were saved with the exception of the catalogue of part of the Pathological Section, and that of the Curio Room, but nearly all of the specimens in this room are described in the "Guide to Surgical Instruments and Objects in the Historical Series." No fewer than 3,750 of the Hunterian specimens which are safe have already been catalogued, and it is expected that this number will be increased. The original Gibraltar fossil cranium is safe; and while much of the teratological collection was lost, the major part of the collection, consisting of 950 specimens, has been saved. Ninety-five specimens, or rather more than one-third, of the Onodi collection are safe. The greater part of the large collection of instruments is also safe and can be restored. Among the instruments that are intact are the Lister, the Moynihan, and the Chinese and Japanese collections; also the series illustrating the evolution of anaesthetic apparatus.

Thus, though the loss that the Museum has suffered is grievous, and much of it is irreplaceable, the destruction of specimens is not quite so great as was at first feared. Enough has been saved to form the basis of the new Museum, which will continue the Hunterian tradition.

NEW SULPHONAMIDE COMPOUNDS

A series of reports from the United States shows that rapid progress is being made there in synthesizing and testing new sulphonamide compounds. We have already referred in this *Journal* to sulphadiazine (2-sulphanilamidopyrimidine), a drug with properties which at least in the pharmacological sense represent an immense advance. These are fully confirmed in a careful study of its absorp-

tion, distribution, and excretion by O. L. Petersen *et al.*[1] Higher blood levels are attained with this drug than with any other sulphonamide compound, and sustained longer, so that it evidently need not be given more often than six-hourly. The concentration in the blood plasma exceeds that in the blood cells, an advantage shared with sulphathiazole; on the other hand, where sulphathiazole is at some disadvantage—namely, in reaching the cerebrospinal fluid in a concentration only one-third of that in the blood—sulphadiazine resembles sulphanilamide and sulphapyridine in attaining a concentration two-thirds of the blood level. Conjugation is slight and not progressive, the acetyl compound being readily excreted. More welcome to patients themselves than any of these properties will be the fact that this drug does not cause nausea or even mental depression. It is known to be active against all the chief infections amenable to sulphonamide treatment, but comparative studies of therapeutic efficacy have yet to be made.

Two other new compounds have made their appearance in America, neither of which seems at first sight to have such outstanding properties as sulphadiazine, although each has its interesting points. "Promin" is the name given to the sodium salt of *p*.*p'*-diamino-diphenyl-sulfone-N.N'-dextrose sulphonate, and a series of papers by J. A. Toomey and his colleagues[2] records some preliminary clinical trials with it. This drug is best given intravenously in 5-gramme doses thrice daily; oral administration is said to cause more toxic effects, and to have also the disadvantage of irregular absorption. It appears from these studies only that the drug is reasonably well tolerated and has an action comparable with that of sulphanilamide on streptococcal infections. A more remarkable action is illustrated in the work of W. H. Feldman *et al.*[3] on experimental tuberculosis in the guinea-pig. The drug was here fed to the animals with no apparent difficulty or ill effect, and seems to have retarded the progress of the disease after inoculation with virulent tubercle bacilli in a very striking way, but the experiment was complicated by intercurrent infection and needs to be repeated. It was shown some years ago by Rich that large doses of sulphanilamide retarded the development of tuberculosis in the guinea-pig to some extent, but the effect achieved here was evidently greater.

A third new compound on trial in America is sulphanilylguanidine, which has quite different properties and uses. Owing to its low degree of solubility and slow absorption, it is possible, as E. K. Marshall *et al.*[4] have now shown, to maintain saturation of the intestinal contents with the drug, while the blood concentration remains low. It has accordingly been used, and with some success, in the treatment of bacillary dysentery. This is perhaps not quite as hopeful a sphere of action as, for instance, the urinary tract, but anything with a specific local effect on intestinal infections, even if less sure and speedy than what we can now see elsewhere in the body, will be a welcome innovation.

[1] *Amer. J. med. Sci.*, 1941, **201**, 357.
[2] *J. Pediat.*, 1941, **18**, 1, 6, 10.
[3] *Proc. Mayo Clin.*, 1940, **15**, 695.
[4] *Johns Hopk. Hosp. Bull.*, 1941, **68**, 94.

EMPLOYMENT OF WOMEN IN INDUSTRY

The medical problems, many of them with a sociological bearing, which have been created or intensified by the recent entrance of large numbers of women into industry were debated at a meeting of the Association of Industrial Medical Officers held recently in London. Dr. M. L. Dobbie-Bateman, in opening the discussion, based her remarks on the sickness records for the five years 1935-9 of a group of about 6,000 people employed in a retail distributive house, the sexes almost equally represented. The average annual number of days lost through sickness for each male worker was 4.01 and for each female worker 6.36. An analysis of the conditions which caused sickness showed in respect of diseases of the genital organs a 500% excess among females over males, but the total number of days lost in this group was so small as to be almost statistically negligible, being only 0.24 out of 6.36 for the female worker, and 0.04 out of 4.01 for the male. The same applied to the 200% excess amongst female workers on account of dental disease. Respiratory diseases accounted for just about half the total of sick absenteeism, and here the female excess over the male was 75%. Only in respect of diseases of the locomotor system and of accidents were the male figures in excess of the female. Dr. Dobbie-Bateman's conclusion was that there was a consistently higher sickness rate among women employed in industry, that gynaecological conditions did not entirely explain the excess, and that a large part of the female disability was due to the fact that the working woman tried to do two things at once—to earn her living and to be responsible for her household duties. Miss F. I. Taylor, Deputy Chief Inspector of Factories, said that in peacetime the women working in factories were mostly young; the average life of a woman in a factory was reckoned at ten years, from school-leaving age until 24, but now there was a tendency for older and married women to be employed. One important consideration was the hours of employment. Peacetime restrictions in this respect could not be maintained, and longer hours were being worked than those concerned with factory welfare could approve, but, generally speaking, an endeavour was made to keep the working week below 60 hours and to ensure that every woman had one day off in seven or two in fourteen. A return from 5,000 factories showed that nearly half of them were working over 56 hours but under 60. The disadvantage of over-long hours was illustrated by the experience of a factory which had been working 54 hours and found it impossible to maintain production until every third week the hours were reduced to 48. Dr. L. S. Swanston, medical officer at one of the new ordnance factories, mentioned that the incidence of rejection on medical grounds among women applicants for employment was only 7% to 8%; on the other hand, the standard was not high. In her own department, during 1940, 52 women reported pregnant. As soon as this happened the woman was taken off night shifts and overtime, put on sedentary work, and examined every fortnight. She remained at work until the seventh month and was allowed to resume work one month after confinement. In the subsequent discussion it was urged by more than one speaker that women should not be allowed to continue until as late as the seventh month, and that to resume one month after confinement was far too soon, having in view the health not only of the mother but of the child. Dr. Swanston wanted to see the factory medical service extended to include ophthalmic and dental treatment; the amount of dental sepsis she had seen among these girls was astonishing. She also urged the appointment of a panel consultant in each district upon whom the factory medical officer could call in difficult cases. Dr. Graves Peirce described the work of women on the railways, which in peacetime is chiefly clerical or canteen, but now embraces many unfamiliar roles—porters, ticket collectors, van guards, even engine cleaners and loaders of goods trains, and, in one district in Scotland, platelayers. These women had not yet been working, he said, sufficiently long for sickness figures to be of any value, but the most outstanding thing in his experience had been the genuine enthusiasm of the women for this work, which, being mainly out of doors, was to many a welcome change from ordinary factory life, and their health did not seem to have suffered.

CHEST SURGERY IN WAR

This is one of a short series of articles based on lectures given at the British Postgraduate Medical School, Hammersmith

ABDOMINO-THORACIC INJURIES

BY

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Popular opinion is accustomed to associate penetrating injuries of the trunk with grievous mortality, and statistical inquiry only too truly confirms the fatality of wounds implicating the thoracic or abdominal cavity under conditions of modern warfare. The ancients knew the lethal character of wounds of this portion of the human frame; it suffices to mention here the wound of Eurymachus from the arrow from Odysseus's powerful bow, and the injuries inflicted upon Polydorus and Tros by the great Achilles or on Sarpedon by the spear of Patroklos—all these abdomino-thoracic wounds recounted in the Homeric epics proved fatal. The English stage and Scottish history also testify to the gravity of the abdomino-thoracic injury: in Shakespeare's drama, Macbeth unseamed Macdonald from "nave to chap" in the manner of one accustomed to wield the claymore. The backhand of the claymore could easily split a man from clavicle to thigh: many of General Mackay's soldiers perished in this way, endeavouring with their muskets to protect their heads and trunks in that fierce overwhelming rush of Graham of Claverhouse's men at Killiecrankie.

The surgery of those regions which adjoin the midriff is not entirely modern. The behaviour of wounds of the diaphragm received in warfare has been known to surgeons since the days of Ambroise Paré, and was accurately noted and discussed by Guthrie when writing of the war surgery of the Napoleonic era. The surgical treatment of thoracic wounds by Guthrie and by Baron Larrey, Napoleon's Surgeon General, has proved no inaccurate presage of the modern treatment of gunshot injuries of the chest. In respect of the repair of visceral injuries on the abdominal aspect of the diaphragm, over six centuries have rolled past since Henri de Mondéville counselled suture of the colon and affirmed the recovery of some of those who had received wounds of the large intestine.

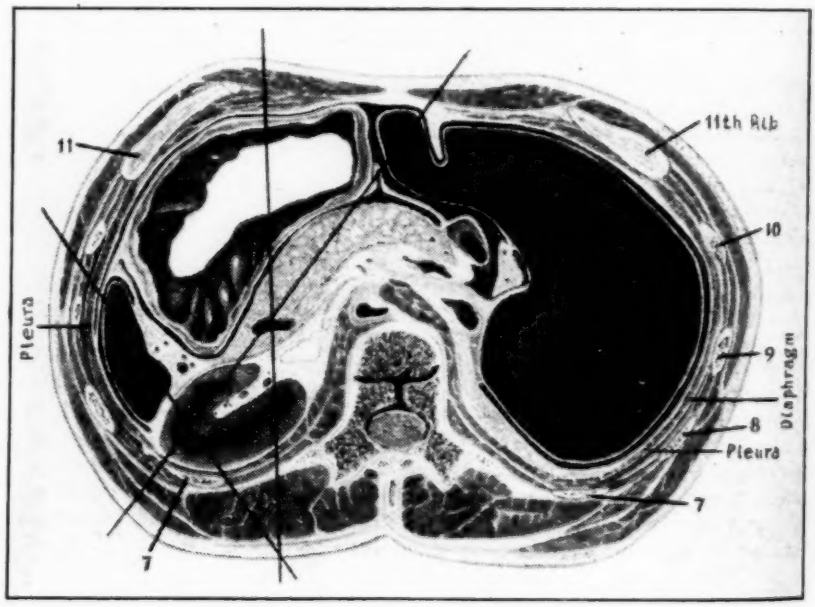

FIG. 1.—Horizontal section through abdomino-thoracic zone to demonstrate the organs liable to injury in penetrating wounds of this area.

Injuries which involve thorax, diaphragm, and abdomen may be of penetrating or of non-penetrating character. In the war of 1914-18 the first-named group completely overshadowed and outnumbered those which were subparietal lesions.

ON PENETRATING ABDOMINO-THORACIC INJURIES

In one series of cases from the war of 1914-18 (Sir Cuthbert Wallace, 1922) abdomino-thoracic cases constituted 12% of the abdominal cases which reached the casualty hospitals of an army; the operations performed on this group of patients also accounted for 12% of all the abdominal operations in that army. In the Spanish Civil War the proportion of abdomino-thoracic wounds in all wounds of the belly admitted to a hospital of first urgency was not dissimilar to that which obtained in 1914-18—i.e., 11% (Jolly, 1940). Abdomino-thoracic injuries formed 9% of a certain series of thoracic cases admitted to a "clearing station" (Gordon-Taylor) during 1918.

Statistics of abdomino-thoracic wounds culled from the Official History of the War of 1914-18 demonstrate that in a vast majority the abdominal lesion determines the gravity of the prognosis, and, further, that wounding of the hollow abdominal viscera greatly augments the fatality of the injury. The most fleeting glance at any anatomical atlas will demonstrate those organs most likely to suffer in abdomino-thoracic injury (Figs. 1 and 2). It will at once be apparent that the anxieties occasioned by a wound of the left dome of the diaphragm must greatly exceed those which are aroused by right-sided penetration of the midriff.

In a series of addresses on various aspects of the surgery of the chest by different lecturers it is obviously desirable to aim at some uniformity of nomenclature, classification of wounds, etc. I therefore make no apology for utilizing the excellent classification of penetrating abdomino-thoracic wounds given by my friend Tudor Edwards:

1. The chest and abdomen may be penetrated by separate missiles, the wounded man sometimes becoming a veritable St. Sebastian, his abdomen and chest riddled with fragments of high explosive or machine-gun bullets.

2. Missiles may penetrate the chest, and may emerge through the abdominal wall or be retained within the belly; on the other hand, the track of the missile may be in the reverse direction—the wound of entry in the abdomen and the fragment retained within the thorax.

3. Traversing wounds of the lower chest, especially if inflicted during expiration, may pass through the diaphragm and occasion damage to the abdominal organs lying immediately subjacent to the midriff.

4. Tangential wounds of the lower thorax in which considerable damage, including diaphragmatic injury and perfora-

tion, is produced by the missile and in-driven fractured ribs ("stove-in chest").

The Diaphragmatic Lesion

The injuries of the diaphragm in abdomino-thoracic lesions are mostly in the sloping muscular portion, and are specially frequent where this lies in contact with the thoracic wall. In cases that come to operation the rent is usually small; in one series the linear tear was half an inch long or less in 50% of the cases. Many openings are mere punctures; larger irregular apertures in those suitable for surgery are seldom found to be more than one and a half to two inches in diameter.

Lockwood and Nixon (1918) compared the cardiac and respiratory embarrassment due to a rent in the diaphragm to that produced by an open pneumothorax; on the other hand, Sauerbruch writes that the importance of the diaphragm in relation to respiration and the circulation has been exaggerated. The great improvement in the recovery rate of abdomino-thoracic cases after the diaphragm began to be sutured by British surgeons in the last war may have been partly due to the repair of that muscle, but also to the improved treatment of the thoracic condition and increasing familiarity with the many problems of war surgery. Small wounds undoubtedly heal spontaneously, and others are at least temporarily plugged by omentum, spleen, liver, stomach, etc.

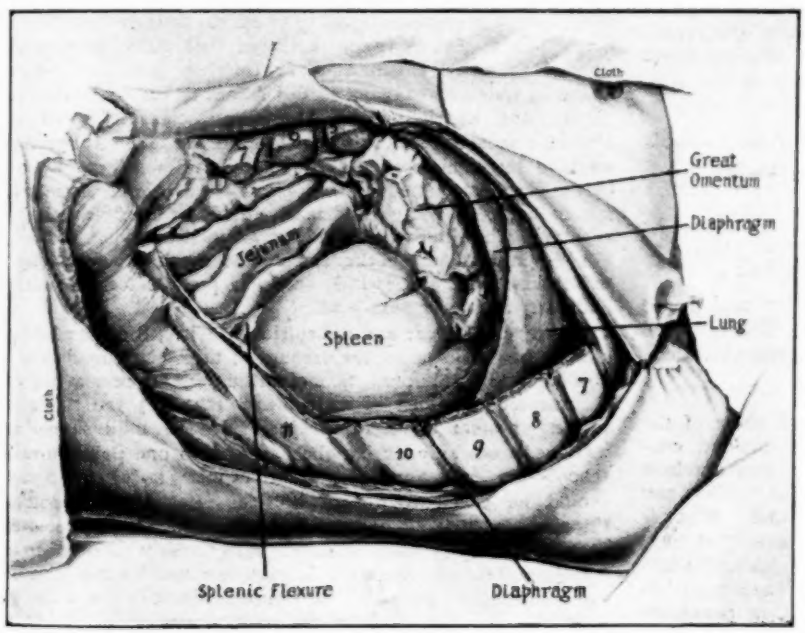

FIG. 2.—Dissection of the left-sided abdomino-thoracic region, showing viscera liable to injury in penetrating wounds. (Prepared by Prof. John Kirk, Middlesex Hospital.)

Wounds of the central tendinous part are obviously more serious than those at the periphery, but some survive. A century ago Guthrie published notes of a man with a wound of pericardium, left ventricle, lung, liver, and the tendon of the diaphragm. The man survived for four or five months; he suffered from palpitation and uneasy sensations in the chest, and died of bronchitis. Fuchsig (Sauerbruch and O'Shaughnessy, 1937) successfully operated upon a stab wound of the right ventricle which also perforated the central portion of the diaphragm. The track passed obliquely inwards from the fifth sterno-chondral articulation, and was thought before operation to implicate the stomach.

Diagnosis of Penetrating Abdomino-thoracic Wounds

Doubt may be felt at first whether the gravity of the condition of a man with an abdomino-thoracic wound is due to the thoracic, to the abdominal, or to other concomitant injury. Nixon (1919), who had great experience of these cases, writes that if there is a fair air-entry into the lungs thoracic injury is not to be held accountable.

The anatomical site of the aperture of entry and of exit of a traversing wound of the trunk limns the track of the missile with fair accuracy. The position of the patient at the time of injury also demands consideration; the structures probably damaged can then be readily adumbrated. In cases in which a fragment of metal, spicules of broken rib, etc., are retained, *radiological investigation* is indispensable; its necessity in estimating diaphragmatic movements and thoracic pathology cannot be overestimated. There are also clinical signs and symptoms which arrest attention and which may clarify, or may, on the other hand, obscure, the diagnosis.

1. *Abdominal rigidity* does not of necessity betoken involvement of the subphrenic viscera. It is well known that injuries of the pleura or lung, especially if situated in proximity to the diaphragm, may occasion abdominal rigidity and may arouse suspicion of an abdominal lesion: (*a*) The abdominal rigidity associated with an injury below the diaphragm is more likely to be bilateral; in the case of a thoracic wound rigidity of the belly wall is usually confined to one side. (*b*) The abdominal rigidity accompanying a chest injury tends to be intermittent, some relaxation of the rectus abdominis occurring during inspiration.

2. Sickness and vomiting have been known to occur in cases of lower thoracic injury, but are more frequent in abdominal lesions, as is eructation of gas.

Diaphragmatic injury is suggested by an almost entirely thoracic type of respiration, with a catch at the end of inspiration, sometimes a definite spasm or hiccup; yet the actual respiratory rate may be little altered. In the late stages of injury to the diaphragm there is fixed pain, exaggerated on exertion and referred to clavicle or scapula according to the position of the injury or location of the retained missile. Pain is induced especially by lifting, coughing, or even deep respiration. The diaphragm is kept motionless on the affected side.

The diagnosis of a wound of the diaphragm is not easy in subparietal injuries. The syndrome of tension pneumothorax may be simulated by the sudden irruption of stomach or colon into the chest. *Radiology* and the determination of the intrapleural pressure enable a correct diagnosis to be attained.

In the case of penetrating injuries the decision as to the time of operation, the type of surgical procedure, and the chronological sequence of the stages of the undertaking will depend upon: (*a*) the degree of shock and collapse of the patient; (*b*) collapse of the opposite lung, as suggested by intense dyspnoea, cyanosis, and respiratory retraction of the chest wall on the contralateral side (in such a case the administration of an anaesthetic and a thoracotomy in the last war usually proved fatal; (*c*) the experience and judgment of the surgeon.

The existence of blast-contusion of the lung is now well established on clinical and *x*-ray evidence and by post-mortem findings, yet it may be only the index of perhaps graver changes in the organs below the diaphragm. Other serious cases may have been in very close proximity to detonating bombs, and may be suffering from a dangerous and grave degree of saturation of the blood by explosive gases, such as carbon monoxide or nitric oxide. The

severity of the clinical state may even be due to such lesions as myocardial trauma. Such possibilities should not be overlooked amid the circumstances of this "total" war; their presence and the existence of other grave multiple injuries heavily load the scales against recovery.

Penetrating Injuries by Large Missiles

The injuries produced inside the abdomen by large fragments of metal or other foreign body are *almost always irrecoverable*; the result is scarcely likely to be different in those wounds if more than one cavity of the body is implicated. I have, however, figured elsewhere a piece of brass tubing, 4⅜ inches long, removed from a Greek soldier, who recovered after the simple extraction of the missile, which had passed from the middle of the right scapula and projected in the epigastrium (Gordon-Taylor, 1939).

Saint (quoted by Gordon-Taylor) had a successful right-sided abdomino-thoracic case, in which a fragment of shell weighing two ounces had traversed chest, diaphragm, and liver and produced two perforations of the duodenum and one in the hepatic flexure of the colon.

In one of my patients, the successful result of whose case is recorded elsewhere, a missile weighing nearly four ounces produced the most grievous damage inside the belly, and fractured the bony wall of the thorax (Gordon-Taylor, 1919). The diaphragm was apparently uninjured, and a strict observance of the approved nomenclature must therefore exclude this case from the category of the true "abdomino-thoracic."

(The second part of this paper will appear in next week's issue, and will contain a list of references.)

FEEDING IN WARTIME

No. 9 of the Wartime Nutrition Bulletin (May and June, 1941) summarizes the latest food facts and makes some observations and recommendations which merit attention.

Sugar and Jam

It believes, for instance, in the psychological value of the jam spread for the average child. The Ministry of Food, concerned to provide a scientifically balanced diet, may overlook these minor yet pressing questions of home life: "What can we have with our bread at tea-time to-day?" and "What is there to give the children for a treat?" The Children's Nutrition Council considers that it would have been well worth while to hold more stores of sugar in reserve. There are large West Indian surpluses available. Great Britain consumed before the war about 2½ million tons of sugar a year. Rationing has reduced this to less than 1½ million tons, of which half a million will probably come from home-grown sugar beet, leaving 1 million only to be supplied from abroad. When it is realized that 350,000 tons are available from Java and India alone, and that the Empire countries are capable of producing 1½ million tons, it will be seen that the world surplus of this commodity will be enormous.

Bread and Wheat

Wheat production is in a similar position. Most of the Australian wheat crop of 1939-40, which totalled 195 million bushels, was purchased for either export or home consumption; in fact, however, it has been possible to ship only 45 million bushels, and in December, 1940, there were 110 million bushels in hand for storage. In the last war Canada's wheat acreage was expanded from 10 to 17 million acres; in this war the position will probably be reversed. By August there is likely to be a surplus of 570 million bushels, and the total storage capacity of the country is only 470 million bushels. Storage on farms or in improvised elevators is not practicable owing to the numbers of mice and beetles that congregate in these places. Meanwhile in England we are assured that there is sufficient grain in the country and that bread is not likely to be rationed. It is not anticipated that barley or potato flour will be used, but if this should be necessary the new types of brown flour will have prepared the population for change.

The brown versus white bread controversy is still being influenced by milling and baking interests, and although the new standard loaf has become a familiar object there are areas where it is slow in making an appearance. The conflict between commercial and scientific interests is complicated by the movement away from the big mills, which are often situated in vulnerable areas, to the smaller inland mills, which are now being reconditioned. These small mills are often well fitted to produce good quality wheatmeal flour, but are at a disadvantage in manufacturing the highly processed modern white variety.

Milk

The most important factor influencing milk yield is the quantity of protein concentrates in the fodder. This is, unfortunately, higher in food coming from abroad than in home produce, so that the total milk yield is practically certain to diminish with the coming winter. It will, however, be a help if farmers can make good silage and hay from the reduced grassland now left to them. "Unprofitable" cows are being removed from the dairy herds in order to conserve food for the higher-yielding animals, but the lack of skilled farm labour may begin to have an effect upon the quality of the stock. Experience is needed in detecting abnormalities at an early stage, and if mastitis is allowed to flourish it will affect both the yield and quality of milk. It is an unfortunate result of the ploughing-up campaign that dairy farmers are obliged to spend much of their time on land cultivation. There is, too, a shortage of skilled labour in the pasteurization plants, and distribution is becoming increasingly difficult. For this reason particular care should be taken to prevent wastage through souring during the warm weather. Much of the surplus summer milk, an extra 10% beyond the normal spring flush, is being condensed, dried, or used for cheese-making. The Children's Nutrition Council considers it advisable to import during the summer as much dried milk and dried skim milk as possible, so as to provide for the winter and early spring of next year.

Shortage of labour and difficulties of distribution are having an adverse influence on the amount of milk being made available for school children. School authorities are now acting on the recommendations of distributors that (a) the "sale or return" system is no longer justified; (b) milk should be delivered once only during the day and to one point in each school—not to several classes as formerly; (c) more care should be taken to return bottles. Board of Education Circular No. 1548, issued on April 17, admits that it will be necessary in many areas to supply milk in bulk rather than in third-pint bottles. Delivery in pint or quart bottles is, however, considered preferable to churns. Parents are asked to provide cups or beakers for the term, and the importance of cleansing these is stressed.

Vitamin C

The importance of vitamin C for children is being continually stressed. One South Midlands town is now ordering in bulk 10,000 synthetic tablets for each of ten welfare centres. If tablets are purchased in quantities of 50,000 the price is 23s. 6d. per 1,000. They are sold to mothers at a farthing per two daily doses of 12½ mg. each. It is pointed out that advertisements for products containing vitamin C are often misleading. Vitamin C may in fact be present, but in insufficient quantities.

Communal Feeding

A picture of communal feeding—the example being an East Anglian industrial town—is given by the Nutrition Bulletin. The town is an evacuation area but few people have left it. The Town Council has borne the primary cost of the five or six feeding centres which have been established, and the Ministries have now approved the scheme. The first established centre provided meals between 12 and 2 o'clock for shifts of 60 people. Numbers rose from 127 on the first day to a regular attendance of between 250 and 320. These figures were not affected by the opening of a second centre

close by, which was serving 200 people a day by the end of the first week, and many had to be turned away. Customers included a few children and an even proportion of men and women. These came mainly from factories, foundries, and shops, and there were a few office workers. As a result of the success of these centres, the Feeding Committee hope to start a school feeding scheme—which this particular town has so far been lacking—if the Education Committee contributes towards the cost. Expansion of the present centres will be made to cover all school districts. The cost of meals, exclusive of overheads which cannot yet be estimated, is at present 4¼d. to 4½d. per head, the average payment being 8¾d. Children will be given a three-course meal for 4d. These low prices depend upon the purchase of bulk supplies of non-perishable foods such as dried apple rings. No tea is provided, as the shift system of meals makes this difficult, but milk is sold at 2d. a cup and is popular. Local diet experts consider that the meals are well balanced, though there may be a deficiency of vitamin D.

Equipment has been expensive and there has been delay in delivery, apparently because the Ministry of Food will not help local authorities working on their own initiative so readily as they will help schemes working under their direct supervision. The limitations of the equipment, and also the size of the available premises, mean that very large centres cannot be organized, and the scheme as yet covers a very small fraction of the population. But the Committee is confident that it will be possible to expand sufficiently to provide meals for all who require them, and official quarters have intimated that, if 40,000 of the population (mainly women and children) should have to be compulsorily evacuated, then the centres may be called upon to feed the workers for two meals per day. Clearly, therefore, the scheme may perform work of vital importance in maintaining health and efficiency during an emergency.

JUVENILE RHEUMATISM AND THE SIGNIFICANCE OF "GROWING PAINS"

LECTURE BY DR. JANET AITKEN

A holiday course in physical education was arranged by the Ling Physical Education Association at Bedford, when a number of lectures were delivered by various authorities, including Dr. Vaclav Benes of the Czecho-Slovak Ministry of Foreign Affairs, who spoke on education in his country, with special reference to the Sokol; Mr. Claude Bridges of the Middlesex Education Committee, who spoke on the gymnastic teacher and the law; and Miss P. C. Colson of the Government's Directorate of Physical Recreation, who described the manner in which physical recreation was being organized nationally. There were also practical classes and group discussions.

The first lecture in the course was on rheumatism in school children by Dr. JANET AITKEN, senior physician, Elizabeth Garrett Anderson Hospital, of which we give a brief summary.

The Question of Diagnosis

After referring to the very large amount of industrial incapacity resulting from diseases classed as rheumatism, and discussing the still obscure aetiology of the acute and subacute forms, Dr. Aitken took up the question of diagnosis, with special reference to "growing pains." At the beginning of the century growing pains were largely ignored by the medical profession, but during the last fifteen years perhaps an undue stress had been laid upon their importance, and in some quarters they were considered synonymous with juvenile rheumatism and the consequent danger of carditis. Limb pains in children were of two types: (1) pains which were felt in the various joints, associated in the acute phase with tenderness, swelling, and heat, and with limitation of movement in the affected part; and (2) pains which were felt in muscles or tendons, not usually tender to touch except where fibrositis was also associated. The pains in both types might be mild or severe. It was pains in the muscle which were commonly called "growing pains."

The lecturer agreed that there were numerous cases of limb pains in childhood which were not rheumatic, but she felt that the distinction was not always easy and that growing pains, as opposed to arthritic pains, might be associated with juvenile rheumatism. In her series of cases, taking the rheumatic children with definite cardiac changes, the number who had muscular pains only was more than double the number who had joint pains only. It was argued sometimes that inasmuch as one-third of the children at out-patient clinics complained of growing pains, it might be expected, without associating growing pains with juvenile rheumatism, that a similar proportion of children with that complaint would also suffer from growing pains. But omitting purely joint pains (which were probably included in the estimate of one-third), in her own series of cases of rheumatic carditis, at least 70% suffered from growing pains. It was also stated that young adults with mitral stenosis often affirmed that they had never had growing pains; but she had had opportunities of proving in a follow-up clinic how unreliable such histories might be.

Methodical Investigation

Dr. Aitken went on to describe in detail her method of investigation in a case of complaint of growing pains:

1. Careful consideration should be given to the possibility that some orthopaedic condition might be the cause of the pains.

2. If no cause was found and the general health was good, no treatment was necessary beyond general instructions about diet and hygiene.

3. If the general health was poor further search for the cause of the pains must be made, including the possibility of malnutrition, anaemia, and any chronic disabling disease. Should no definite cause be found the possibility of juvenile rheumatism remained, but the case should not be labelled rheumatic unless and until definite signs of that disease were present.

4. Should the growing pains persist and the health remain poor, a week or at most a fortnight in bed would very commonly result in cessation of pain and a sustained improvement in health.

5. If the pulse during sleep was raised after a week's rest and there had been even slight fever, further investigation should be undertaken. A sedimentation test was of value and an electrocardiogram might reveal some abnormality. Enlargement of the heart was, of course, of importance, but even with the help of *x* rays minor signs of enlargement were difficult to determine. Except in cases of gross cardiac disability, physical exercise was not contraindicated if under proper supervision, and massage and graduated exercise were very important during convalescence following an acute attack.

In conclusion, she said that juvenile rheumatism, though just as frequent in its occurrence, was not nearly so severe as it was ten or fifteen years ago. Gross cardiac lesions were rarely seen. This might be due to a natural cycle of severity and mildness, or, more probably, in part to an improvement in general hygiene and child welfare and in part to the greater interest taken in the prevention of disease by the medical profession and by workers in public health.

The May issue (No. 9) of *Tin and its Uses* contains a survey of the Tin Research Institute's report for 1940, describing recent technical and commercial developments in the use of tin. Important commercial applications may be found for a combined pickling and tinning process described in this issue. Another article describes the development of the Institute's chemical process for producing protective films on tinplate. The results of canning trials indicate that the film is effective in preventing sulphur staining when used for meat packs, and good results were obtained with some vegetables. *Tin and its Uses* is obtainable free of charge from the Institute, Fraser Road, Greenford, Middlesex.

Reports of Societies

TRICHINIASIS IN MAN

At a meeting of the Section of Epidemiology and State Medicine of the Royal Society of Medicine on May 23, with Dr. J. A. GLOVER in the chair, the subject of discussion was "Factors Influencing the Presence of Trichiniasis in Man."

Aetiology and Clinical Features

Dr. P. B. BEESON of Harvard University said that few cases of trichiniasis had been recognized in Great Britain until recently, but the disease was fairly widespread in many temperate regions, being commonest perhaps in the United States, but very well known also in Germany and Poland. The parasite *Trichinella spiralis* had been known for over a century, and as far back as 1860 trichiniasis was shown to be responsible for severe clinical illness in man, and it was discovered that the disease was contracted by eating the pork of infested swine. Almost any animal which ate meat was liable to the disease, and it had been discovered in at least twenty-five different species. But beef, mutton, poultry, and fish did not come from animals liable to contract the disease. In the United States, where up to 5% of swine had trichiniasis, the chief factor responsible was the feeding of swine with uncooked garbage. In Britain there was little opportunity for this means of swine infestation, and the probability was that the rare cases of swine infestation which did occur in this country were acquired by eating infested rats. Trichiniasis had been found in rats in several areas.

Within the past few months several human outbreaks had been reported in different parts of England and Wales and had evoked a new interest in the clinical and epidemiological aspects of the disease. Since the beginning of this year over 200 cases of fairly severe illness due to trichiniasis had been recorded. Sausage appeared to have been the meat responsible for these local epidemics. Rationing of meat and changes in the composition of sausages had brought about a condition whereby an unusually large number of people ate the meat of a single animal. Furthermore, in view of the fact that a partially protective immunity developed after the attack of trichiniasis, the comparative susceptibility of the British population might have led to the development of more clinical cases than would have resulted from similar exposure of a population previously exposed.

Cooking was a certain means of killing any parasites which might be present in meat, but it might be inferred from the number of cases which had resulted from the eating of sausage that the temperature level necessary for the killing of the parasite was not always obtained in the frying of sausage. Ham and bacon were less dangerous because they underwent some preliminary process of salting or smoking. Refrigeration was not such a certain means of killing the parasite.

During the process of digestion the larvae were set free in the upper part of the small intestine. Here the parasite matured and copulated, the female burrowing into the bowel wall and releasing the embryos, which went into the blood stream and eventually found lodgment, perhaps in the muscles, where they might live for many years, or in the brain, heart, or lungs, where they usually excited a rather acute inflammatory reaction which succeeded in killing the parasite. The clinical syndrome had four cardinal features—fever, oedema of the orbit, eosinophilia varying from 15 to 40%, and muscle pain, often very severe, most prominent at the back of the neck, around the elbows, in the lower part of the back, and in the calves of the legs. Irritation in the lungs could produce a clinical resemblance to pneumonia. Clinical recovery usually began about the second or third week. Complete recovery was the rule. Clinical manifestations were confined to the earlier period of the infestation. Many more cases of latent trichiniasis than of the clinical disease were recognized. Two important factors influencing the clinical manifestations were the size of the infecting dose of the parasite and the resistance or susceptibility of the host. The size of the infecting dose was perhaps more important in this parasitic disease than in bacterial and virus diseases, because there was no possibility of multiplication in the body of the host. Once the female had deposited its embryos no further reproduction could take place. The disease which resulted depended upon the reaction of the individual to the invasion.

In a group of six persons all of whom had had apparently the same amount of contaminated meat, four might be entirely well, one mildly ill for three or four days, and the sixth suffer from severe illness lasting for weeks. It had been shown in the case of animals that one infestation protected to a considerable extent against subsequent infestations. The clinical cases in the United States numbered about 600 in a year. In this country there had lately been three outbreaks in different towns with fifty or more cases in each, and it was likely that many hundreds of other persons were mildly ill at the same time. The only factor which seemed partly to explain why the disease should crop up at the present time was the killing of older sows for sausage meat, such sows being more likely to have been infested than the younger pigs. The most important measures of prevention were to warn the public against the dangers of eating raw or underdone pork and to intensify the campaign against rats.

Sources of Infection

Prof. R. T. LEIPER agreed with Dr. Beeson that the cause of recent outbreaks was not the rearing of pigs on swill; at the same time, the widespread collection of garbage was a danger to this country. At Wolverhampton, where there had been an outbreak, an examination of 145 rats brought in by ratcatchers showed 2 to be positive. At Penrith 164 rats were examined, and 9 were found to be infested; all the infested rats had been caught at the refuse dumps, none of those caught at the sewage works were infested. He gave figures for trichiniasis in Germany in recent years. In 1922, for example, 110 cases were notified, with 1 death; in 1930, 95 cases with 13 deaths; in 1934, 44 cases with 1 death. Swine infestation in the Dutch East Indies was interesting; here from 5 to 7% of female pigs were infested, and very few male pigs, but in the Dutch East Indies, although the dog was markedly susceptible, there was no recorded trichiniasis in man or in the rat. In other parts of the world the susceptibility of the cat was evidenced.

Members of Prof. Leiper's "team" and others described special investigations. Miss M. YOUNG gave an account of the examination of cysts in a number of cases coming to necropsy in the Wolverhampton district; the cause of death had been generally some cardiac condition. In 6 out of 47 such examinations it was evident that there had existed a subclinical infestation with *Trichinella spiralis*, though never diagnosed in the life of the patient. It appeared from her investigation that a certain amount of trichiniasis was endemic in the Black Country. Dr. PHYLLIS CLAPHAM mentioned some experiments which suggested that the host species played some part in determining the rate at which the female parasite matured and the embryos were liberated. Mr. J. W. G. LEIPER described clinical manifestations of trichiniasis in the pig. Dr. W. P. ROGERS illustrated the metabolism of rats with trichiniasis, a study which indicated the possibility of a biochemical diagnosis.

Dr. R. H. H. JOLLY (M.O.H., Wolverhampton) said that actually there had been 98 cases in Wolverhampton, and the epidemic covered a period of thirteen weeks. The source was traced to meat supplied very largely by three wholesale dealers. Should these outbreaks be attributed to the habits of the people or to the fact that there was a residual trichiniasis in the pig farms in that part of the country? He was of opinion that both factors came in. In 280 families in Wolverhampton, or 37% of those investigated, an admission was obtained that raw sausage was eaten, either by the housewife or by other members of the family.

FORTY YEARS OF UROLOGY

The annual meeting of the Section of Urology of the Royal Society of Medicine was addressed by Sir HUGH LETT, P.R.C.S., on his forty years' experience in that specialty. In no branch of surgery, he said, had diagnosis been brought to such a high degree of accuracy. The outstanding factors in urological progress were the discovery of *x* rays and later the development of pyelography, the remarkable evolution of the cystoscope, the tests for renal

efficiency, and the advances in the medical treatment of urinary infections. In its early days pyelography was not devoid of risk, for collargol was employed as the opaque medium, and unfortunately it led to a fatal issue in certain cases in which the pelvis was overdistended, and as a result the calices ruptured and pyelo-venous backflow ensued. This difficulty was overcome by substituting for collargol a solution of sodium bromide or iodide, which was innocuous and proved satisfactory. But although ascending pyelography was of value in the diagnosis of obscure cases, it was not always applicable, necessitating as it did the passage of a catheter up the ureter to the renal pelvis. The discovery of intravenous pyelography was a great advance, and now the urinary surgeon would regard an operation on the kidney as unthinkable unless either intravenous or catheter pyelograms, or both, had previously been made.

Treatment of Prostatic Obstruction

The developments in the treatment of prostatic obstruction made one of the most interesting chapters in the progress of urinary surgery. For many years catheterization had been the routine. Catheter life, as it was called, was strongly condemned, and it had even been stated that patients who wholly depended on the catheter were not likely to survive for more than two years. This was not so, provided that adequate precautions were taken and the patients kept under careful supervision. Sir Buckston Browne had two patients who lived to be a hundred, and for the last twenty years of their lives passed all their urine by catheter. But there were cases in which catheter life was unsuitable or even impossible.

Suprapubic prostatectomy was first performed by Belfield in the United States and McGill in this country. In 1901 Freyer started his campaign, and by persistent advocacy made suprapubic prostatectomy the standard surgical treatment of enlarged prostate. The general mortality, however, was heavy, some patients dying from haemorrhage and some from infection, but most often the deaths were from uraemia. Not until 1909 was attention drawn by Stillman to the value of preliminary decompression in these cases, either by catheter or through a suprapubic puncture, but some years elapsed before its importance was generally realized. The adoption of decompression in certain cases and the discovery of the tests for renal efficiency, particularly those for estimating the retention and excretion of nitrogen, stood out as landmarks in the history of prostatectomy. Any discussion on prostatectomy would be incomplete without a reference to resection by diathermy. In skilled hands this had proved particularly useful when the prostate was small or when the obstruction was caused by a middle lobe. But, in this country at least, suprapubic prostatectomy remained the operation of choice when the gland was much enlarged.

One of the greatest triumphs in the history of bladder surgery was the destruction of vesical papillomata by diathermy, introduced by Beer in 1910. How great it was could only be realized by those who saw these cases when the only method of treating recurrences was by further operations, whereas now all that was needed was a simple treatment which could be given in the consulting-room or the out-patient department.

The Urethra and Urethroscopy

One of the considerable changes which had taken place in hospital practice during the last forty years was the decline in the number of patients who presented themselves with strictures of the urethra which were severe and almost impermeable or associated with important complications. At the London Hospital in 1897 no fewer than 50 cases of stricture were operated on, 45 by internal and 5 by external urethrotomy, but in 1937 there were only 4, all treated by internal urethrotomy. Again, in 1897 there were 19 cases of perineal abscess and 6 of extravasation, and in 1937 only a solitary case of perineal abscess. In addition, 27 cases were treated by dilatation under an anaesthetic in 1897 and 16 in 1937. These were remarkable figures. The great majority of strictures were due to gonorrhoea, the treatment of which forty years ago was limited almost entirely to drugs and local injections of astringent or antiseptic lotions by a hand syringe. It was not surprising that many patients were uncured, and only those who saw those cases and knew how difficult they were could fully sympathize with Ricord's remark, picturing hell as a place where he was surrounded by patients suffering from uncured gleet! Only when the urethroscope was modified to allow air distension did it become of real value. Then it became possible to diagnose and treat with far greater accuracy local lesions and also to discover areas of local infiltration which limited the expansion of the urethra under air distension and treat them by full dilatation with a Kollmann dilator. The value of the urethroscope in this respect was summed up by Frank Kidd, who said that with this instrument the course of a stricture could be followed from its birth until, at the hands of the Kollmann dilator, it met its death.

Sir Hugh Lett concluded with some remarks on the difference between forty years ago and to-day in respect of antiseptic precautions. The scanty regard paid to surgical cleanliness in those early days offered a ready explanation of the cases of perineal abscess and extravasation of urine and cellulitis that so often occurred. To-day adequate precautions were taken against infection, the urethra was carefully irrigated, and every instrument introduced into it was sterilized. Instances of urinary fever were very rare in relation to the large number of cases now treated in urological clinics and out-patient departments, and the fact that so much instrumentation could be done without ill effects was a striking testimony to the progress made during the last forty years. He paid tribute to the work of British urologists—Thomson Walker, Frank Kidd, and Hurry Fenwick (the " wizard of the cystoscope "), among others.

Mr. JOCELYN SWAN added a few remarks in the same vein of reminiscence. Progress in urology, he said, had been due to three factors: cystoscopy, *x* rays, and chemistry. There had never been sufficient collaboration between the surgeon and the radiologist. Intravenous pyelography should not be entirely relied upon, because very often there was a rather doubtful shadow; it should be followed by an ascending pyelogram before the condition was determined. In urological conditions, especially growths in the testes, but also in the bladder, *x* rays were of value in treatment as well as in diagnosis. Contact therapy by the Chaoul apparatus had proved of service. He uttered a word of warning against indiscriminate chemotherapy. He had seen two patients die after comparatively small doses of sulphapyridine, and he had seen other unfortunate, though not fatal, results. All cases which were given any of the sulphonamide drugs should have a forced fluid intake, and careful quantitative estimation should be made.

FATIGUE AFTER SKILLED WORK

The Ferrier Lecture on " Fatigue following Highly Skilled Work " was delivered before the Royal Society by Prof. F. C. BARTLETT, F.R.S., on May 29.

If the character and causation of fatigue following highly skilled work were to be understood, the first need, he said, was for the discovery of more relevant and experimentally controlled facts. Unfortunately almost all the investigators who had attempted to study fatigue of this type had adopted methods taken over with very slight change from those which had proved valuable in the study of simple muscular fatigue. They chose elementary operations usually considered to require some " mental " effort—such as easy calculations, word or colour recogniton, and naming and the like—repeated these operations over and over again for long periods, and tried to express the resulting fatigue in terms of the diminution in quantity or quality of the work done. The skill fatigue of daily life was not set up under such conditions. Routine repetition of simple actions was not a characteristic of any highly skilled work, and least of all of work having a strong " mental " component. The operations involved here were marked by complex, co-ordinated, and accurately *timed* activities. The stimuli in response to which these activities were set up were neither simple nor did they usually fall into an order of fixed succession. They had the character of a field, or a pattern, which had become very highly organized, and might retain its identity in spite of a great diversity of internal arrangement.

It was possible to develop fully controlled experimental situations in which these realistic considerations had full play. When this was done the picture of fatigue following highly skilled work which emerged had certain strongly marked characters. In such fatigue the " standards " accepted and followed by the central nervous system unwittingly deteriorated. The operator tended to think that he was doing better work, because errors treated as significant all the time got wider and wider limits. Until a stage of great fatigue was reached it was far more likely that the right actions would be performed at the wrong times than that the wrong actions would be performed. If accurate timing was insisted upon, gross mistakes of action might appear. The stimulus field split up. Its pattern character altered. It became a collection of unconnected signals for action, with some of these predominant over all the others. Particularly stimuli which were in the margin of the pattern, not closely

organized with the central field, were ignored, "forgotten," and serious lapses of specific reactions occurred. There was a marked change in the effect of certain "distracting" or additional stimuli. Sensations of bodily origin, in particular, became more pressing and insistent and affected the performance in ways peculiar to the tired operator. Side by side with all these changes went constant subjective symptoms. Verbal reports about any circumstances connected with known failure of performance became increasingly inaccurate, and errors were regularly projected upon objective conditions, or attributed to the interference of other people. There was a tremendous growth of irritability.

In conclusion, Prof. Bartlett discussed the light thrown by this picture upon the relation of high-level central nervous functions to simpler neuromuscular mechanisms.

Correspondence

The Chronic Sick in Bombed Towns

SIR,—I am informed from absolutely reliable sources that there are still hundreds, if not indeed thousands, of "chronic sick patients" being maintained in institutions in those of our large towns which have been repeatedly bombed during the last few months. I am also informed that, despite the facts that many "chronic sick" patients have been killed and others seriously injured, and that in some instances the buildings in which they are housed have been seriously damaged with consequent great discomfort to both patients and staff, the Ministry of Health obstinately declines to remove these unfortunate bedridden patients to places of comparative safety and comfort outside our large towns.

If Hitler was our Minister of Health it would be easy to understand, but what are we to say when this sort of thing goes on unheeded in our own Christian country and yet no one makes any attempt to raise the question either in the Press or in Parliament? I may add that I have written to one of our prominent daily papers on the subject: they have simply refused to publish my letter. Why has it escaped the notice of our medical Members of Parliament, or are they afraid to raise such a ghastly injustice in the House? I am writing this letter to you, Mr. Editor, in the hope that the *British Medical Journal* will vigorously advocate immediate steps being taken to put an end to the agonizing apprehension from which these poor persons must be suffering from day to day and night to night.

Perhaps it might be worth while adding that the accuracy of the statements made to me can easily be tested by a question in the House as to the numbers of such persons still being housed in public health and public assistance institutions as well as voluntary hospitals and homes for incurables in London and other large towns.—I am, etc.,

Criccieth, May 22. FREDERICK MENZIES.

Control of Tuberculosis

SIR,—In these days of strain and hustle of war, tuberculosis is apt to be forgotten or shelved. Dr. James Maxwell's article (May 3, p. 665) on the dangers from the tubercle carrier is a timely reminder and warning, and should indicate that there are defects—serious defects—in our tuberculosis service. Are we on right lines? The facts outlined by Dr. Maxwell would seem to show that we are not. Year by year we spend large sums on sanatorium treatment—treatment which is costly and disappointing when compared with other standards in medicine. We patch up lungs and perhaps add a year or two to the life of the consumptive, but massive infection and bad home conditions still hold sway and account for thousands of cases of tuberculosis every year. The death rate has fallen certainly, but tuberculosis still attacks the person we can least afford to lose—the young adult. Yet we allow the open case or carrier to leave sanatorium, with or without consent, to return home to infect others. In time these contacts themselves become tuberculous and find their way to our orthopaedic hospitals and sanatoria; and so the vicious cycle is complete.

Our costs are increasing, taxation (local and national) is increasing, and our post-war commitments are likely to be on a colossal scale. Let us therefore direct expenditure on tuberculosis into channels most likely to produce results. Prevention is still the keynote to success. After twenty years' experience in tuberculosis I would suggest the following:

(a) Select a number of sanatoria up and down the country where up-to-date treatment and diagnosis can be carried out and pool the beds. Divide the country into regions and then invite local authorities to join together to share these beds. This would allow the smaller and poorer authorities to get over the difficulty of providing costly sanatoria of their own. If fresh air and rest is all that is required, this could be carried out at home under the supervision of the medical attendant. Confine admissions only to such cases as will respond to skilled treatment—that is, to some form of collapse therapy. Stop crowding our sanatoria with chronics and incurables.

(b) Adequate accommodation for the segregation of open and advanced cases. It should be incumbent upon every scheme-making authority to provide this in institutions near the homes of the patients and in the substandard sanatoria. Regard tuberculosis as an infectious disease and make the segregation of open cases or carriers compulsory until such time as they can be rendered safe. The present law requires amending to simplify its application.

(c) Compel local authorities to provide adequate housing accommodation for its tuberculous population—subsidizing the houses if need be.

(d) Introduce a pension scheme for tuberculosis. It is well known that poverty and privation lead to a furtherance of the disease in families. Link this scheme up with an extension of the training college and settlement scheme on Papworth principles, with at least one colony for each region.

(e) A stricter control of the milk supply.

It may be said that to carry out these proposals will add considerably to the cost of tuberculosis. The initial cost may be great, but I believe it would be money well spent and in time would reap its own reward and effect a considerable saving to the nation. I may add that these are entirely my own personal views.—I am, etc.,

Wakefield, May 14. G. E. JOHNSTON.

"Bureaucratic Surgery"

SIR,—The correspondence under this caption initiated by Mr. Norman C. Lake (April 19, p. 602) must be welcomed by all who are interested in the welfare of the E.M.S.

The improvisations of September, 1939, are evolving into a more organized service, and only those responsible for its efficiency can be fully aware of its many difficulties. These are inherent in the grouping together of varied medical services and their change over from a peacetime to a wartime basis. It is no doubt in these circumstances that "the latest orders" of which Mr. Lake complains have arisen—namely, that all head injuries should be transferred for treatment to special neurological units, the term "head injury" to include scalp wounds in which there is no evidence of bone involvement. In support of this instruction Mr. D. W. C. Northfield (May 10, p. 728) cites certain cases of bad surgery which have come to his notice as surgeon in charge of a special head centre. But, surely, ignorant surgery is not to be bettered by withdrawing all cases into special centres, but by spreading more knowledge to engender better surgery.

Without doubt, wherever it is possible to develop a highly organized service, then special centres are of the greatest value and surely welcomed by all. But, again, will either the public or even special centres be well served if it is they who are "to tackle everything"? There is surely a surgery, informed and restrained, which is immediate to the wounding, and which extends to the first hospital of reception. Few will suggest that an open extradural or sinus haemorrhage should be left to be transferred to a special centre, and, further, there is a surgery of knowledge, rather than immediate action, in the constant watch for neurological signs in the unconscious patient too ill to be moved. Again, cases of multiple wounding (and there are many of them)—say a scalp wound and a penetrating abdominal wound—immediately dispose of bureaucratic surgery and require investigation, judgment, and prompt treatment. Selection of suitable cases for transfer to special centres must vary somewhat with time and place, but with co-operation is not difficult. Selection is based on knowledge and not dangerous rule of thumb.

To the special centres the general surgeons should look for knowledge, research, instruction, and an understanding of both their difficulties and their opportunities. Good general surgeons will certainly not be made by depriving them of all their material—the *reductio ad absurdum* of the extreme specialization to which Mr. Lake refers.

The hard anvil of war has exposed many weaknesses, not the least of which, perhaps, is the unfortunate specialist who finds himself promoted "general surgeon," with many responsibilities for which he has had neither the training nor the experience. Amid the uncertainties of total war, the most generally useful tool will be the man who is well trained in the traumatology of all the systems, and his loss will be greater than any other. However, the general surgeon and the specialist are not mutually exclusive but complementary. The danger lies in promoting one at the expense of the other. Perhaps the best work of special centres will lie in the training of more and better general war surgeons.

The Postgraduate School at Hammersmith has provided some excellent lectures on war surgery. Its work should be extended both in London and in the country, and its value would be greatly enhanced on the clinical side by the co-operation of the special centres. We badly need a school of military or war surgery for all who would aspire to the honour of treating the wounded.—I am, etc.,

J. M. CHRISTIE, M.B., F.R.C.S.Ed.

London, N.3, May 17.

Pulmonary Concussion

SIR,—The advantage of using the term "pulmonary concussion" for haemorrhagic lung lesions due to trauma is that it does not limit us by views on aetiology not generally agreed upon. This admission that I did not know what part blast played in causing the lesions reported (April 5, p. 506) makes the letters of Prof. S. Zuckerman and Dr. P. L. Krohn (April 26, p. 645) largely meaningless. It was shown that pulmonary concussion occurs more frequently in the victims from bombed houses—that does suggest that blast has been a factor. Necropsies on air-raid victims should be on unselected cases, as with road accidents the probability of lung lesions depends largely on the type of victim but cannot be foretold.

I hope that Prof. Zuckerman will not continue to detract from his valuable experimental work by making statements about humans which are almost nonsense—for example: (1) To speak entirely in terms of wave motion in bombed houses, etc., is misleading; there has been a sudden addition of a large volume of gas which must escape. In many houses the thin dividing walls offer least resistance and probably go first. Such houses may go as a unit; I am sure I have seen some which did. The familiar mess makes the statement by Prof. Zuckerman comic relief (unless it refers to animal experiments): "If the explosion is insufficient to break the walls of an 'average' house (that is, if the explosion is a small one) the blast wave is reflected from wall to wall until its energy is absorbed and the pressure falls to that of the normal atmosphere." (2) The human factor is so variable that it would be surprising if the same lesions were found in different people after exposure to the same force (except that be, as Dr. Krohn reminds me, within 10 feet of a 500 lb. bomb). Will an accurate history of the incident ever tell us if the lungs were in the inspiratory position at the time of the explosion? In bombed houses (with explosions) there will always be many unknowns. Prof. Zuckerman should realize the extent to which he has forgotten the human factor from a fantastic comment he made on his Case 2 (*Proc. roy. Soc. Med.*, 1941, 34, 185). Case 2 was a woman in a steel shelter with three other people. A near miss displaced the shelter 30 feet. The only fatality was this woman, who sustained lung lesions. After speculating on the cause of these lung lesions he says, "On the other hand, the possibility that she may have been directly affected by blast cannot be excluded, for it is conceivable that she was just within, and the other occupants of the shelter just outside, the cone of blast." (3) This idea of a force threshold cannot be accepted for human beings; it is how the force is applied that matters. If there is a force threshold, then the two strong men who died after simple falls (*Journal*, 1940, 2, 317) should not have done so, and a young sailor who was run over by a trailer weighing 5 tons 15 cwt. should have had pulmonary concussion but did not (case reported in *British Heart Journal* by Dr. Hugh Barber and myself).

Dr. Krohn makes the old mistake of thinking that animal results will be reproduced in detail by human beings when he speaks of the abdominal lesions. The compressive force sends the base of the lungs, etc., downwards and the abdominal organs upwards; they meet going in opposite directions; hence the lesions are typically of upper abdominal organs. Mere crushing is not the whole answer.

Many misunderstandings would be avoided if the pathology of the lesions were agreed upon. I suggest that "pulmonary concussion" be used in a broad sense for haemorrhagic lung lesions due to trauma. When, and if, a lesion caused by blast alone is proved, "blast" should be in its name. Pulmonary concussion has primary, secondary, and reactionary lesions. The primary lesions are (1) phrenico-costal sinus contusion, (2) "rib markings," and (3) massive hilar contusions. These need not all be present and in severe cases may be confluent. The first two types are common in civil life, the third is rare—I believe it is brought about by a mechanism similar to the penny experiment (Sutherland, G. A., *Lancet*, 1940, 2, 641). Each alveolus with air locked in by glottic spasm and speed of compression acts as a penny and transmits the force until the immovable structures near the hilus are reached; here the alveoli are ruptured. I believe that it takes a very large force to cause massive hilar contusion and that this is the lesion Dr. Joan M. Ross (*Journal*, January 18, p. 79) speaks of as essentially a lesion of blast. The secondary lesion is multiple spots of inhaled blood; this may be so mixed with the primary lesions that it will be difficult to unravel them. Reactionary lesions still need much observation.

Further observations are much needed on:

(1) The reaction of the lung to inhaled blood. Ideal subjects for this study are suicides who shoot themselves through the head. The amount of congestion and fluid effusion into alveoli about some of these haemorrhagic spots is surprising—unlike the big primary lesions where the capillaries are compressed by the blood. This secondary lesion has been confused with the primary concussive ones in some cases which have been reported.

(2) The process by which the large lesions resolve—may cavitation follow pressure necrosis of alveolar walls?

(3) The incidence of lung lesions in minor cases.

(4) More radiological surveys similar to that of Dr. J. L. Livingstone (*Proc. roy. Soc. Med.*, 1940, 34, 90), where lesions are correlated with the "state of the patient."

Dr. Krohn shows that he does not understand the clinical problem when he says that pulmonary concussion is infrequent in hospital practice because Dr. A. M. M. Payne (*Journal*, April 12, p. 564) found no case in 226 admissions. Dr. Payne writes "from the point of view of the organizer," not the research worker. Pulmonary concussion is often a sub-clinical entity; it can frequently be overlooked with no danger to the patient; for example, a woman had a bomb injury of the brain which proved fatal after two and a half months; at necropsy I found a right phrenico-costal sinus contusion which had not been recognized and played no part in causing her death. These lung lesions are common in the wards just as they are in the post-mortem room, but they have to be hunted for in unselected cases. The subject is a research one to a very large extent, and for that reason I should like to see groups of pathologists, radiologists, and clinicians appointed to see the lungs of as many air-raid victims as possible.—I am, etc.,

Derby, May 17. G. R. OSBORN.

Silk in the Darning of Hernias

SIR,—If Mr. Rodney Maingot, who writes on this subject in your issue for May 24 (p. 777), will refer to the *Journal* of November 25, 1922 (p. 1024), he will find a full description of the method, which I had then used for many years. It is, however, notorious that the employment of plain silk introduces a certain risk of infection even in the most careful hands, and I therefore used a method of preparation developed from that devised by Lange some thirty-five years ago. Briefly, floss silk is boiled for one hour in 1/1,000 biniodide of mercury in watery solution, transferred from this to 1/1,000 biniodide in alcohol for dehydration, and kept for storage in liquid paroleïn. The silk thus treated is soft and flexible, retains its full tensile

strength, and sets up no irritation in the tissues. The impregnation with a mercury salt renders it immune to early infection but does not prevent the ingrowth of tissue cells, which ultimately convert it into an inextensible structure closely resembling tendon in its histology. Lange used mercurialized silk for the construction of artificial tendons with great success, and I have myself employed it for this purpose on many occasions. It furnishes a surgical material of first-rate value and many applications, among which the treatment of difficult hernias is not the least important.—I am, etc.,

London, May 26. H. S. SOUTTAR.

Subcutaneous Ligature of Veins

SIR,—Critics of my method of subcutaneous ligature (April 26, p. 626) suggest that it is painful, dangerous, and unreliable. With your permission I shall try to correct these impressions.

Essentially, the method entails inserting one stitch in clean skin. Most doctors would agree that they can do this safely, and in fact do so on many occasions in their ordinary work. Mr. N. L. Eckhoff (May 10, p. 729) quotes cases of recurrence after saphenous ligation, but does not allow for the effect of the sclerosing injections. Combining injections and ligation enables the whole length of the affected vein to be completely blocked. Early recurrence in these circumstances appears most unlikely if venous pressure at the upper limit of the occluded portion is normal. This latter proviso must apply to any method of treatment. I agree with Mr. Eckhoff that the Trendelenburg operation is a serious business, with possibilities of disaster, and would suggest that it be reserved for the worst cases.

Dr. S. McAusland (May 17, p. 763) describes the method as "crude," and states, wrongly, that the needle is passed through the vein. The small Rotunda pattern needle is passed between the vein and the deep fascia, and with practice perforation of the vein does not occur. Using novocain as described, there is no more pain caused than an ordinary injection of sodium morrhuate would be expected to produce. "Crude" is the last word one would apply to any method which obtains the desired result with the maximum economy of effort.

My excuse for writing to you at this length is simply this. Dr. Sicard described his method of treating varix by injection in 1923. In spite of the efforts of surgeons and general practitioners, there are still thousands of people in need of effective treatment. In my own practice in two years I have found nearly forty cases requiring ligature. One can only guess at the total number in the country, but it is apparent that all the theatre staffs available could make very little impression on it.

I would urge, therefore, that general practitioners should grapple with the problem, using the method they find best, and make a determined effort to abolish varicose veins.—I am, etc.,

Bradford, May 19. H. S. RUSSELL.

Adrenal Grafts in Addison's Disease

SIR,—In their article on the treatment of Addison's disease by adrenal graft (April 26, p. 617) Drs. F. Katz and F. Mainzer say that a transplantation should not be looked upon as successful "unless there is definite improvement over a period of months in a case of undoubted Addison's disease." They could find only five cases in the literature which fulfilled these requirements, the periods of observation varying between five and twelve months. Their own case was observed for fifteen months after the operation, but, as Dr. J. J. Conybeare rightly pointed out (May 3, p. 688), the diagnosis could not be regarded as indisputable, as there was never any pigmentation of the skin or mucous membrane.

The following case shows that even an extreme degree of pigmentation of skin and mucous membrane does not make the diagnosis certain, nor does improvement lasting for two years prove that an adrenal graft has effected a cure of the disease. A man of 41 was admitted under my care at Guy's in November, 1920, for increasing asthenia with occasional vomiting since January. During this period his skin had become deeply pigmented, and there were numerous dark patches and black spots in addition to the general brown colour. Patches of brown pigmentation were present in the mucous membrane of his mouth. On admission his systolic blood pressure was 120 mm. Hg, but it fell to 80 mm. during his stay in hospital. He was readmitted in April, 1921; he was so weak that he could neither walk nor stand. Mr. W. E. Tanner then grafted into the patient's testicle the adrenal gland of an eight-months infant immediately after its death, which occurred during parturition. The patient's blood pressure rose in the next four weeks from 75 mm. to 120 mm., the vomiting ceased, and he regained his strength sufficiently to be able to do light work, but the pigmentation remained unaltered. He was shown at a meeting of the Clinical Section of the Royal Society of Medicine in February, 1922, when he was accepted as a typical case of Addison's disease apparently cured by an adrenal graft.

He remained at work for another year. His symptoms then gradually returned, and he was found to have anaemia with a high colour index, achlorhydria, and a slightly enlarged and hard spleen and liver. It was now thought that he might have Addison's (pernicious) anaemia simultaneously with Addison's disease. On June 12, 1923, his condition suddenly deteriorated, his blood pressure fell to 90 mm., and he died in July—two years and three months after the operation and three years and eight months after the onset of symptoms.

At the post-mortem the adrenal glands were found on macroscopic and microscopical examination to be perfectly healthy. His liver was cirrhotic and contained excess of iron. There can be little doubt that he died from Addison's anaemia and that this was the cause of his pigmentation. Some excess of fibrous tissue, but no trace of adrenal tissue, was discovered on microscopical examination of his testicle.

I may add that among the numerous physicians who saw the patient during the two years he was under observation, the only one who even questioned the diagnosis of Addison's disease was Dr. J. J. Conybeare.—I am, etc.

Oxford, May 21. ARTHUR HURST.

SIR,—With reference to the paper by Drs. F. Katz and F. Mainzer (April 26, p. 617) and subsequent correspondence, may I state that, although it is obviously prudent to question the diagnosis in a case of supposed Addison's disease without pigmentation, such an apparent absence of pigmentation does not signify the incorrectness of the diagnosis. Obvious pigmentation of the buccal mucous membrane is not an essential feature of Addison's disease, and pigmentation of the skin may be inconspicuous in acute cases or in fair-skinned patients. Nevertheless, a case of supposed Addison's disease without pigmentation and without the characteristic biochemical changes in sodium metabolism is not an ideal one to illustrate the apparent benefit from an adrenal graft. In my limited experience of the effect of adrenal grafts in Addison's disease the result is either negative or temporary, but others may well have been more fortunate.

The implantation of tablets of desoxycorticosterone in the subcutaneous tissue under local anaesthesia is a procedure which is effective for a period of some four or more months and can be repeated. In this connexion one must remember that desoxycorticosterone is not the only essential hormone of the adrenal gland, but the clinical effect is usually satisfactory.

Although Dr. H. M. Stanley Turner (May 24, p. 798) gives theoretical reasons for suggesting that the prognosis in women with Addison's disease would be less unfavourable than in men, in actual fact this does not appear to be the case, although occasionally one meets with a woman patient who seems to make a recovery following the climacteric, the assumption here being that the adrenal cortex, as well as the pituitary, undergoes hypertrophy in this phase.—I am, etc.,

London, W.1, May 23. S. L. SIMPSON, M.D., F.R.C.P.

Acute Abdominal Pain after Opium

SIR,—The experiences which have been recorded under the above heading are probably explained by the experiments carried on for several years at the Mayo Clinic on the mode of production of biliary colic, especially by W. L. Butsch, J. M. McGowan, and W. Walters (*Surg. Gynec. Obstet.*, 1936, **63**, 451). These experiments have received less attention than they deserve. When a meal is taken the gall-bladder contracts, the sphincter of Oddi relaxes, and the bile runs into the duodenum. The pressure necessary to overcome the

resistance of the sphincter is usually low—about 20 mm. of water. It was found that in normal animals morphine causes contraction of the sphincter. A subcutaneous injection of 1/6 grain of morphine sulphate caused the pressure in the common bile duct in man to rise to 200 to 300 mm., the rise starting in a few minutes and lasting several hours. In those patients who had previously had colic a similar pain occurred, but in others only discomfort; yet it would not be surprising if more severe symptoms were met with in an occasional case. These experiments explain the common clinical observation that biliary colic is often made worse by a small injection of morphine, the drug being ineffective until the dose is so large that its dulling action on the higher centres overrides the increased spasms of the sphincter of Oddi and the rise of intrabiliary pressure which is the origin of the pain. Atropine causes relaxation of the sphincter normally, but has little or no effect in counteracting the action of morphine. Inhalation of amyl nitrite may produce an instant fall of pressure and relief of symptoms, but the action is temporary. Glyceryl trinitrate grain 1/100 placed under the tongue has a similar action—slower in onset but more lasting. These results have been confirmed by H. Doubilet and R. Colt of New York (*Surg. Gynec. Obstet.*, 1937, **64**, 622).—I am, etc.,

London, W.1, May 25. H. LETHEBY TIDY.

Capillary Fragility and Vitamin C

SIR,—The conclusion of Drs. N. U. Khan and M. Minn (May 17, p. 752) that capillary resistance decreases as diet deteriorates is hardly justified on a basis of forty children (even were it shown that the eight children with high petechial counts had persistently high counts before ascorbic acid was given to them). Although some authors consider capillary resistance a dependable test of vitamin C intake, others disagree. Greene (*J. Amer. med. Ass.*, 1934, **103**, 4) found that lowered capillary resistance did not necessarily denote low vitamin C intake in children. He found much variation in capillary resistance when the same children were tested at different times. Rapaport *et al.* (*J. Pediat.*, 1940, **16**, 624) titrated the vitamin C in the blood plasma of children. They found no correlation between low capillary resistance and hypovitaminosis C.

Positive-pressure capillary resistance tests should be done simultaneously on both arms, as the difference between the number of petechiae on each arm may be large. Subjects with low capillary resistance should be tested repeatedly, and it should be noted that healthy persons on the same diet may show marked differences in capillary resistance (for example, Davis, *Lancet*, 1940, **2**, 312).—I am, etc.,

London, S.E.10, May 21. ELI DAVIS.

Laryngitis in Secondary Syphilis

SIR,—In your issue for May 24 (p. 798) there is a letter from Major H. S. Sharp describing a case of "secondary syphilis is one of its rarer manifestations—that is, laryngitis." According to this letter, the "points of interest are: (1) The only complaint was hoarseness; the appearance of the larynx suggested the diagnosis. (2) Mucous patches on the tongue only."

The laryngitis described in this case is most certainly not a rare, but an exceedingly common, manifestation of the secondary phase of syphilis. In my book *Venereal Diseases* (p. 147) is set out a table showing that in a series of 500 consecutive patients of both sexes sore throat and hoarseness occurred in 54 per cent. Where the vocal cords show only hyperaemia and no mucous patches or eroded areas the condition is usually quite painless. The peculiar type of hoarseness is practically pathognomonic. The presence of mucous patches upon the tongue only is not in the least degree uncommon in secondary syphilis. Before the patient reported sick, however, such patches may have been present on other parts of the buccal mucous membrane. Such lesions are often very evanescent—here to-day and gone to-morrow.

From the description of the voice, the larynx, the tongue lesions, and the cervical adenitis, the diagnosis of syphilis was much more than merely suggested, and hardly required—except in the interests of completeness—the discovery of anal condylomata lata, a positive blood serology, and a history of a penile sore.

When I was director of the L.C.C. (Whitechapel) Clinic and lecturer in V.D. at the London Hospital Medical College, I would have been very disappointed in any medical student or postgraduate who regarded the conditions set forth in Major Sharp's letter as being rarities in the acute (secondary) stage of syphilis.—I am, etc.,

Paignton, Devon, May 24. E. T. BURKE.

Loss of Vision following Haemorrhage

SIR,—In his article on loss of vision following haemorrhage (May 24, p. 774) Colonel H. L. Tidy states that only one case of severe loss of vision occurring in pernicious anaemia has been recorded in the literature. This statement appears to be at variance with recent reports of optic atrophy occurring in this disease.

Prof. Henry Cohen has reported cases in which the earliest clinical feature of this disorder was optic atrophy (*Lancet*, 1936, **2**, 1202). Similar cases demonstrating the association of pernicious anaemia with optic atrophy have been recorded by Kampmeier and Jones (*Amer. J. med. Sci.*, 1938, **195**, 633), and Aldren Turner (*Brain*, 1940, **63**, 225). That the visual loss in such cases is not directly attributable to the anaemic state of the blood is shown by its occurrence when the blood count and haemoglobin content are but little altered.—I am, etc.,

London, S.W.6, May 29. L. HARRIS, M.B.

Scabies Epidemic in a Civil Population

SIR,—In the last months of the year 1918 there was an outbreak of scabies in Vienna which spread rapidly. The Ministry for Public Health therefore decided, on the advice of M. Oppenheim, to open a special centre for the treatment of scabies, which was attached to the Department for Skin Diseases of the Wilhelminen-Hospital. The expenses were paid partly by the Government and partly by the panel for workmen. While in the time from 1918 to 1920 27,413 patients were treated, their number fell steadily in proportion to the improvement of the social conditions, especially of the housing accommodation. In 1925 there were 1,031 and in 1930 only 276 patients. After 1931 there followed a sharp rise, and in 1935 (last available figure) 2,539 patients had to be treated. There can be no doubt that that increase was caused by the economic crisis prevailing at that time in Central Europe.

The treatment carried out at the centre was as follows. After the patient had been rubbed with soft soap he got a bath for about half an hour. After the bath the body was dried and rubbed with Hardy's ointment (pot. carbonate 1 drachm, sublimed sulphur 2 drachms, petroleum jelly 1½ oz.). The patient was covered with blankets and had to stay for two hours in a warm room. The treatment ended with a bath and the application of Lassar's zinc paste. The whole treatment lasted for about four hours, and therefore it was possible to work in two or even in three shifts a day.

The excellent results obtained with the work of the centre seemed to depend on several factors: Diagnosis and treatment were concentrated at one place, where a trained staff was available. It might be pointed out that the diagnosis of scabies can be very difficult sometimes—for example, early scabies of people who live hygienically, cases masked by a dermatitis or an eczema following improper treatment, and, especially among children, cases with secondary infection. No patient was admitted to treatment until all members of his family or all persons living with him had been examined. Cases in which the diagnosis was doubtful were treated. After diagnosis each patient was given a leaflet embodying the necessary information—namely, to bring a change of underwear to the treatment centre and to disinfest, by boiling, his bedding and underwear after coming home from the treatment. Patients who seemed to be unsuited to the treatment at the centre because the scabies was too far advanced or they had a dermatitis, etc., and all children under the age of 10 were taken into the hospital and treated, according to age and clinical signs, with Wilkinson's ointment or with sulphur ointment. This treatment lasted from three to seven days. Infants were taken in with their mothers. One of the principal rules was to treat the whole family at the same time.

The treatment used at the Vienna scabies centre compared with modern cures (rotenone, benzyl benzoate) had the disadvantage that it could not be done at home and that it

took a few hours' time. Working men had usually to take a day off. Its advantages were that only one treatment was necessary and that the drugs used were cheap and easily obtainable. Provided the cases were carefully selected the number of recurrences was small.

There were many reinfections, caused chiefly by the fact that not all members of the family were brought for examination or that the directions about disinfestation of bedding, etc., were not obeyed. A close co-operation with a social welfare centre would be of the greatest value to overcome these difficulties. It ought to be especially stressed that group examination and group treatment, disinfestation, and improvement of housing conditions are the most important factors in dealing with a scabies epidemic. The mere treatment of single cases, however effective the treatment might be, will never be sufficient to extinguish the epidemic. Simultaneously with the scabies epidemic among men there was a scabies epidemic among animals, first among horses. There were many cases of scabies among cats, goats, etc. From grazing goats scabies was transmitted to chamois and did considerable damage among game in some districts of the Alps. The animal scabies was interesting; even as late as 1930 people were infected with scabies from their pet cats. The signs of scabies transmitted from animal to men are different from the ordinary scabies and the diagnosis is often difficult. Reinfection occurs till the source—for example, the infected cat—is treated too.—I am, etc.,

Belfast, May 8. A. FESSLER.

Physical Medicine, Orthopaedics, and the Services

SIR,—The controversial views which pervade both your annotation of April 26 (p. 633) and the letters in the correspondence columns criticizing this make it clear that all is not well with the status of physical medicine. In its present form it appears to be no more satisfactory to the physiotherapists than acceptable to his colleagues—the orthopaedist in particular. That this should be so could not possibly come as a surprise to anyone who has watched the trend of events over a period of years. The truth is that the physiotherapist of to-day occupies an untenable position inasmuch as he desires to rank as a universal clinician specialized in a particular group of therapeutic measures. Such a combination invites suspicion and must result in his extinction.

From the letters signed by some orthopaedic surgeons (May 24, p. 791) it is obvious that physiotherapy is looked upon by them as their own rightful "sphere of influence." Such a conception also has objectionable features, for it would lead to a monopoly which might create an anomalous situation such as a gynaecologist having to refer cases requiring intrapelvic diathermy to the orthopaedic department for this type of treatment.

The only other alternative is one where the medical man whose main interest is in the development of physical methods assumes a position somewhat similar to that of the pharmacologist, his programme being the application of physical principles to the diagnosis and treatment of pathological conditions. This, of course, implies investigation of the action of physical agents and the elaboration of technique and posology. For such an ambitious scheme to be successful a number of conditions would have to be satisfied. The physiotherapists, who incidentally should have made a thorough study of physics and mechanics, would have to be in charge of physiotherapy departments in hospitals so as to have access to the clinical material essential to the advancement of this science. At the same time some degree of decentralization should obtain as regards the treatments which have been accepted as valuable, for which the indications are clear-cut, and of which the technique and posology have been established. The importance of close and continued collaboration between the physiotherapist and his colleagues cannot be sufficiently stressed, since without this a wholesome critical element of the patient's progress would be wanting.

It is not possible in a letter of this type to embrace every facet of what must be considered a revolutionary idea, but I feel that such a change would be for the better and would put an end to strife, which must otherwise continue on account of the insoluble nature of the problem.—I am, etc.,

London, W.1, May 26. P. BAUWENS.

SIR,—The recent correspondence in your columns discusses and criticizes the work and status of physical medicine. Some orthopaedic surgeons and others claim that physical medicine should be ancillary to the field of orthopaedic surgery and should be controlled by them with the help of technicians or similar personnel.

It must be recorded that the apparatus and agents employed in physical medicine have biological or physiological actions which include: (1) the counteraction of shock; (2) analgesia and relief of pain; (3) the production of heat, including fever —that is, artificial pyrexia; (4) augmentation of the capillary circulation—counter-irritation; (5) stimulation of metabolism, vitamins, and cell growth; (6) bactericidal effects and surface sterilization: (7) the increase of local and general immunity, prophylactic measures (preventive medicine); (8) the excitation of movement, massage, physical exercise, manipulation, rehabilitation, etc.; (9) psychological effects. These reactions can only be successfully obtained by the training and employment of skilled physicians, who have obtained specialized knowledge of the most suitable apparatus or agent necessary, of the method of application of that apparatus or agent, and of the dosage to be administered by the qualified personnel under their supervision.

Only 10% of the work of physical medicine falls within the scope of the orthopaedic surgeon; about 35% is devoted to the treatment of rheumatic diseases and arthritis, etc.; the remainder is equally divided between the dermatologist, the gynaecologist, the neurologist, and others. It is impossible to conceive the true position of physical medicine as one which is ancillary to orthopaedic surgery alone. In support of Sir Morton Smart's remarks (May 24, p. 792), the position of the orthopaedic surgeon is little different from that of the neurologist, the ophthalmic surgeon, or other specialized department which needs to employ physical medicine. The ideal method must be co-operation between the physiotherapeutist and the personnel under his supervision. The system by which the general practitioner, physician, or surgeon refers his cases to the department of physiotherapy (usually accompanied by inadequate prescription) must have serious deficiencies. In practice the treatment is left to the discretion of the technician or personnel attached to this department. With the best will in the world they cannot give full justice to the patient or obtain the results to be expected from the help and advice of the specialist. The fallacy of such methods is seen in the administration of prophylactic treatment to industrial workers in factories. The general adoption of such policy must finally lead to the complete disappearance of the specialist in physical medicine, since he cannot survive without the recognition of his special knowledge or without support from his colleagues.

In my own opinion manipulative treatment should be carried out solely by orthopaedic surgeons; after-treatment may need the correct co-operation between the orthopaedic surgeon and the physiotherapist.

The present position of physical medicine is unhappy and does not encourage special training or specialization. The department of physical medicine usually treats a high percentage of the total number of patients who attend the outpatient department, but often it has no working specialist. Too much is left to the discretion of the technician, and as a result treatment is often inadequate, disappointing, or unduly delayed. It is practically impossible for the consultant in physical medicine to give his service to more than one or two hospital departments. His work calls for regular attendance in the department for many hours so that he can supervise the treatment carried out by the personnel; it is frequently necessary for him to carry out the treatment himself. Full collaboration with his colleagues is essential, and in special cases the combined effort is needed—for example, in conditions affecting the larynx or the eye, and in gynaecological cases. I hope that in the near future all departments of physical medicine will be directed by an actively working consultant specialist, who will devote regular and adequate time to his duties; in addition, the teaching of nurses and training of students and doctors must be organized. I cannot see any future for specialization or the successful organization of the work of physical medicine unless such plan and programme are rapidly supported.—I am, etc.,

London, W.1, May 26. ALBERT EIDINOW.

Medical Planning Commission

SIR,—I have noticed, with some little regret, criticism of the Medical Planning Commission. This commission does represent all that is best in our profession, and we should be grateful to its members for giving up so much of their time to work from which they can derive no possible personal benefit.

Much has been said and much written lately on the establishment of a State Medical Service, but whether or not such a service shall be established is for Parliament and not for us to decide. All that we can do is to attempt to safeguard the advancement of medicine and the interests of our patients, and protect our own professional life. We have learned during recent months from bitter experience what dire results panic legislation can have, and it is undoubtedly in the national interest that the future of medicine shall be discussed now, so that we may not be caught unprepared in a difficult post-war period. It is to be hoped that the Medical Planning Commission and the medical profession generally will see the terrible dangers of the deification of the State—this dread paganism which is overrunning the world, a paganism more dangerous and more evil than any previously known in the world's history, a paganism which is demanding for its god—the State—human sacrifice on a scale hitherto undreamed of.

Much of the influence exercised by the Church has passed away, but medical practitioners individually and collectively still do exercise some influence on public opinion, and the Medical Planning Commission will have to face and consider great sociological problems affecting the lives of millions.

It is the plain duty of all who wish to see a better world for the next generation to give their utmost support and assistance to this commission.—I am, etc.,

New Barnet, May 25. JOHN ELAM.

Obituary

DUGALD REVIE, M.B., C.M., D.P.H.

The death occurred at Dumfries on May 13 of Dr. Dugald Revie, who had been for many years a well-known figure in Newcastle-upon-Tyne and Northumberland B.M.A. circles.

Born in Glasgow (writes "W. S.," a pupil and admirer) as long ago as 1862, Dr. Dugald Revie was until quite recently the moving spirit of the Morpeth Division of the B.M.A., and engaged in active general practice until a few weeks ago. He received his early education at the George Square Academy, Glasgow, and went on to Glasgow University, where he graduated M.B., C.M. in 1889. In the same year, after a theological course, he was ordained a minister of the United Free Church of Scotland, and sent to India as a medical missionary. He spent twenty very fruitful years (1889-1909) at Wardha, Central Provinces, doing a great work during the plague which ravaged those districts in 1898. For this he received Government recognition, as also for the devoted work he did for the leper asylum at Wardha during the years 1894-1909. Dr. Revie entered into the municipal life of his district (as well as being guide, philosopher, and friend to the people in his capacity as missionary) by serving as vice-chairman of Wardha Municipality 1891-1900, and chairman 1900-4.

After twenty years' service in India Dr. Revie retired to the homeland on account of his wife's health, and began a second long and useful career in this country. He practised at Blairgowrie in Perthshire for about three years, taking in 1912 the St. Andrews D.P.H. and becoming M.O.H. of the neighbouring district of Rattray with the control of Strathmore Hospital 1910-13. Dr. Revie bought a practice at Ashington, Northumberland, in 1913, and gave his services in a voluntary capacity, as captain in a Northumberland Field Ambulance, to the R.A.M.C., acting also as a surgeon attached to Ashington Hospital during the last war. He quickly identified himself with medical and medico-political activities on the Northumberland coalfield, and soon became a force in North-Eastern B.M.A. circles, being instrumental in carrying out agreements between the doctors and the miners' lodges on various occasions. It was largely due to Dr. Revie's influence that the Ashington Public Medical Service was founded in 1927. Of this very successful venture he was honorary secretary until his death. He served the Morpeth Division of the B.M.A. in many capacities from 1914 to the present time, being hon. secretary from 1931 to 1938, when he retired on account of failing health. He acted as delegate at several Representative Meetings of the B.M.A., his advice being often asked on medico-political and medico-ethical subjects by doctors in Newcastle-upon-Tyne and Northumberland. He was also a member of the Northumberland Panel Committee and an authority on N.H.I. matters. His last public service was as hon. secretary of the Morpeth (Northumberland) Local Medical War Committee, which post he held from 1938 until his death. In addition to being universally beloved as a family physician in his adopted district, Dr. Revie was well known and respected in Church circles, especially amongst North of England and Scottish Presbyterians. He had the unique distinction of holding a seat in both English and Scottish Presbyterian Assemblies. He used to recall as one of his pleasantest memories his taking part in the historic march through Edinburgh at the time of the Union of the United Free Church with the Established Church of Scotland in 1929.

JOHN W. C. GUNN, M.A., M.B.

Professor of Pharmacology, University of Capetown

We regret to announce the death on May 4 of Dr. John William Cormack Gunn, professor of pharmacology and dean of the faculty of medicine in the University of Capetown. During his early years in South Africa he had been honorary secretary of Cape of Good Hope West Branch of the British Medical Association, and at the Centenary Meeting in London in 1932 he was vice-president of the Section of Pharmacology and Therapeutics.

John Gunn, like his elder brother Prof. J. A. Gunn, M.D., of Oxford, was a native of Kirkwall, Orkney, where he was born on January 29, 1889. From Kirkwall Burgh School he went to the University of Edinburgh and distinguished himself as a student, winning the Neil Arnott Prize on graduation as M.A. in 1908. He took the M.B. and Ch.B. degrees in 1912, and after some months as assistant in materia medica in the University laboratory at Edinburgh was appointed assistant in the Department of Pharmacology at University College, London. He held that post for six years and then went to Belfast as lecturer in pharmacology at Queen's University, and taught there until his election in 1919 to the chair of pharmacology at Capetown. During the last war he served in Egypt as officer in charge of the Medical Division of the 19th General Hospital at Alexandria with the temporary rank of major R.A.M.C. and was mentioned in dispatches.

Besides his work as professor of pharmacology and dean of the faculty of medicine at Capetown Prof. John Gunn undertook the duties of curator of the Wernher and Beit medical laboratories and head of the Medical Students' Residence. He published several papers on pharmacological subjects in the *Journal of Pharmacology* and the *Transactions of the Royal Society of South Africa*.

H. O. NICHOLSON, M.D.Aberd., F.R.C.P.Ed.

Past President, Edinburgh Obstetrical Society

Dr. Harry Oliphant Nicholson died at a nursing home in Edinburgh on May 26. The second son of Prof. H. Alleyne Nicholson, M.D., D.Sc., who held the chair of natural history in the University of Aberdeen, he was born on March 13, 1870, and from Gordon's College went to study medicine at his father's university, where he graduated M.B., C.M. in 1891, and was awarded highest honours and the Strathcona Prize for his M.D. thesis some years later. His early clinical experience was gained as house-physician and house-surgeon at the Royal Hospital for Sick Children, Aberdeen. This was followed by post-graduate obstetrical work in Berlin. He then practised for eight years at Kirkcaldy, moving at the end of the century to Edinburgh, where he spent the rest of his life.

Dr. Oliphant Nicholson was made a Fellow of the Royal College of Physicians of Edinburgh in 1904, by which time he had been appointed to the staff of a number of medical institutions. For twenty years he worked as senior assistant physician to the Royal Maternity Hospital, retiring in 1924. He was also lecturer on clinical obstetrics in the University of Edinburgh, and examiner in midwifery at his own university and for the Scottish Midwives Board. Dr. Nicholson was a

popular teacher, with a gift for imparting the practical side of his subject. Throughout his working life he combined general practice with the specialties of midwifery and gynaecology. As a colleague has written in the *Scotsman:* "He represented the type of practitioner who in some ways is characteristic of one of the most attractive aspects of Scottish medicine—the family doctor who plays a multitude of parts." He was a kind and generous man, devoted to his patients, and in turn they looked upon him as their friend. He had been a member of the British Medical Association for nearly fifty years.

SIR D'ARCY POWER

Dr. J. D. ROLLESTON writes:

The excellent survey of Sir D'Arcy Power's life and work in the *Journal* of May 31 (p. 836) contains one slight error and two omissions. The International Congress held in London in 1913 was an International Congress of Medicine and not an International Historical Congress as stated by the writer of the obituary, though its Section XXIII, to which Sir D'Arcy contributed a paper on the lesser writings of John Arderne, was devoted to the history of medicine. The International Congress of the History of Medicine held in London, of which Sir D'Arcy was vice-president of honour and I was general secretary, did not take place until 1921. The omissions, which are not unimportant, as they are concerned with Sir D'Arcy's interest in public health, are as follows. First, there is no mention of his having been a nominee of the Ministry of Health on the Metropolitan Asylums Board from 1921 to 1927, during which period he served as chairman of the Pinewood Sanatorium, Medical and Nursing Subcommittee, and member of the Tuberculosis Subcommittee, Infectious Hospitals Committee, and North-Western Hospitals Subcommittee. Secondly, some mention should surely have been made of his interest in venereal disease, on which he gave evidence before a Royal Commission as representative of the Royal College of Surgeons and the Royal Society of Medicine in 1914, and contributed many articles to periodical literature, as well as being co-editor with J. Keogh Murphy of a *System of Syphilis*.

We regret to announce the death by enemy action of Dr. R. EDMUND SYMES-THOMPSON at the early age of 28. The son of Dr. H. E. Symes-Thompson, consulting physician to the Royal Chest Hospital, and grandson of the late Edmund Symes-Thompson, M.D., F.R.C.P., Richard Edmund studied medicine at Cambridge and at St. George's Hospital, graduating B.A. in 1934 and taking the M.R.C.S. and L.R.C.P. diplomas last year. At St. George's he won the Sir Charles Clarke prize and the Thompson medal, and since qualification he had been resident anaesthetist there and house-physician at St. Luke's Hospital, Chelsea.

Universities and Colleges

UNIVERSITY OF CAMBRIDGE

The Committee for Medical Radiology and Electrology has fixed dates for the D.M.R. and E. examinations in 1942 as follows: Part I, February 10 and July 8; Part II, July 7 and October 6.

At a Congregation held on May 24 the following medical degrees were conferred:

M.B., B.CHIR.—(By proxy) I. B. Mackay, A. R. P. Ellis.

UNIVERSITY OF EDINBURGH

The University Court has approved the following recommendations of the Faculty of Medicine:

(1) That psychiatry be added as a subject in the final professional examination in medicine in the fourth year: a written paper and an oral examination, conducted by the professor and lecturer, with an external examiner.

(2) That candidates for the Diploma in Medical Radiology be required to have had at least two years' postgraduate experience: six months as resident surgeon in a hospital and eighteen months' general clinical experience; and that it is desirable that they should have had postgraduate experience in morbid anatomy and morbid histology.

The Services

CASUALTIES IN THE MEDICAL SERVICES

ROYAL NAVY

Surgeon Lieut. IVOR MCNEIL DRYSDALE, R.N., was killed on active service in March. He was the youngest son of the late Mr. Drysdale and Mrs. Drysdale of Glasgow, was educated at the University of Glasgow, where he graduated M.B., B.Ch. in 1935, and entered the Royal Navy in 1936. He leaves a widow.

Surgeon Lieut. JAMES OXENHAM FIELDING, R.N., was killed when H.M.S. *Hood* was sunk last month. He was the only son of Dr. and Mrs. S. J. Fielding of Norwich, and was educated at Queens' College, Cambridge, and St. Thomas's Hospital, qualifying M.R.C.S., L.R.C.P. in 1938. He had held the posts of clinical assistant in the ophthalmic, psychological medicine, and ear, nose, and throat departments, and senior ophthalmic house-surgeon, at St. Thomas's Hospital before entering the Royal Navy in 1938. He leaves a widow. He was a member of the British Medical Association.

Wounded

Temporary Surgeon Lieut. Alexander Watt, R.N.V.R.

ROYAL ARMY MEDICAL CORPS

The death is reported on active service in the Middle East in May of Captain DONALD STARR. He was the only son of Mr. and Mrs. J. Starr of Wigan and graduated M.B., Ch.B. of the University of Manchester in 1926. He had held the posts of house-surgeon at the Manchester Royal Infirmary and medical officer at the Kent County Mental Hospital, Chartham Down. He leaves a widow. He joined the British Medical Association in 1928.

Lieut. ALASTAIR HAIR died in April of wounds received in action. He was the elder son of the Rev. James and Mrs. Hair of Edinburgh, and was educated at the University of Glasgow, where he graduated M.B., Ch.B. in 1931. He resided in Edinburgh for a time after graduation and then moved to Presteigne in Radnorshire until 1935, when he was appointed medical officer of health for Llandrindod Wells.

Medical Notes in Parliament

Diphtheria Immunization

In a reply on May 29 to Prof. Hill, Mr. BROWN said it was estimated that if three-quarters of the number of children at each year of age below 15 were immune against diphtheria and this level were maintained year by year the disease would be practically abolished. It would be premature to forecast the result of the steps now being taken to promote immunization. He trusted the good sense of parents would in the great majority of cases lead them to secure for their children this vital protection.

Answering Mr. Leach on the same date, Mr. BROWN said the number of deaths from diphtheria in the 126 great towns during the first quarter of 1941 was greater than in the corresponding periods of 1939 and 1940. The number of notifications in the same period was greater than in the first quarter of 1940, but less than in the first quarter of 1939. He had no figures, as yet, to show the increase in the number of children immunized during the first three months of 1941. This could not be related to the total of deaths from diphtheria in persons of all ages. Nor could the effects of the disease over a short period be related to the number of inoculations carried out in that same period, immunization being essentially a prospective and long-term safeguard. He was not aware of any facts which suggested that immunization caused outbreaks of diphtheria, but there was ample evidence that in places where it had been widely applied to children under 15 the disease had been practically eliminated.

Hospital Physiotherapy Departments

General Sir GEORGE JEFFREYS asserted that there were hospitals staffed with one or more masseuses acting under the direction of surgeons who had no specialized training in this branch of medicine, and that physiotherapists were appointed to the staffs of hospitals only in the event of an application being made for such an appointment by the medical superintendent of the hospital. He asked Mr. Brown to direct that physiotherapists be appointed whether the medical super-

intendent applied or not. Mr. BROWN said on May 28 that the policy of advocating the provision of physiotherapeutic departments in all Class I hospitals with 300 or more casualty beds was announced in a circular of June 25, 1940, and in subsequent statements. The existing methods of staffing these departments were generally satisfactory. His department had in a number of cases invited hospital authorities to consider the appointment of physiotherapists. It would not be wise to insist upon such appointments against the wishes of the clinical staff of the hospital. No alien physiotherapist had yet been appointed to a post under the Ministry.

EPIDEMIOLOGICAL NOTES

Infectious Diseases for the Week

With the exception of measles, the incidence of all the common infectious diseases decreased during the week. The notifications of measles, which fell by nearly 3,000 in the previous week, rose by 989. The increase was fairly general throughout the country, the returns from Buckinghamshire, Herefordshire, London, and Sussex being the highest of recent weeks. In Scotland the notifications were less than half those for the preceding week, which had been exceptionally high. Edinburgh is the only area which did not report a decrease.

Whooping-cough

The notifications of whooping-cough for the counties of England and Wales showed only minor fluctuations from the totals returned for the preceding week. The relatively large rise in the prevalence of the disease in Buckinghamshire, Durham, and Suffolk West was contributed by the rural districts; the increase in Essex was general throughout the county. In Glasgow 403 fresh cases were notified during the week, as compared with 714 in the preceding week.

The notifications of scarlet fever in England and Wales declined by 47 and by 43 in Scotland. Approximately one-seventh of the total cases were recorded in Lancaster.

Diphtheria

The fall in the northern regions and Wales was responsible for the decrease of 73 in the notifications of diphtheria; the tendency was to an increased incidence in other parts of the country. The lowest figure—171—of recent months was recorded in Scotland. The intensive drive by the Ministry of Health for immunization against diphtheria has been well supported by local medical officers, and their reports show that a large number of children have already been treated.

Enteric Fever

Forty-one cases of enteric fever were notified in England and Wales, a reduction of 9 compared with the preceding week. From the scattered outbreak in Middlesex 17 fresh cases were recorded, an increase of 4. The next largest total was received from Lancaster, 7, an increase of 5 cases. The total of 40 cases reported from Scotland was 9 below that of the previous week. Dundee, with 27 cases, is still the principal centre of the disease.

Dysentery

The incidence of dysentery declined by one-third in England and Wales during the week reviewed. A further 8 cases were notified in Lancaster, Whiston R.D., and in the two London outbreaks 7 new cases occurred in Islington and 10 in Wandsworth. A decrease of 8 was recorded in notifications from Scotland, but in the city of Aberdeen the figure rose from 7 to 12.

Cerebrospinal Fever

The number of new cases of cerebrospinal fever notified in England and Wales during the week was 266, a decrease of 60 on the total of the preceding week, and was the lowest weekly total since the second week in January. Small increases were reported in some areas; the highest of these was 6 and was recorded for Cheshire and Devonshire. In London there were only 16 notifications, as compared with 37 in the preceding week. In Scotland 65 cases were notified during the week, an increase of 28 compared with the preceding week. The largest returns were from Glasgow, 20; Edinburgh, 9; and the County of Ayr, 8; the remaining 28 were from twenty-two areas.

Typhus Fever

An outbreak of typhus fever was reported as occurring on May 17 in the Clogher district of West Clare. One death has occurred.

No. 19

INFECTIOUS DISEASES AND VITAL STATISTICS

We print below a summary of Infectious Diseases and Vital Statistics in the British Isles during the week ended May 10.

Figures of Principal Notifiable Diseases for the week and those for the corresponding week last year, for: (a) England and Wales (London included). (b) London (administrative county). (c) Scotland. (d) Eire. (e) Northern Ireland.

Figures of Births and Deaths, and of Deaths recorded under each infectious disease, are for: (a) The 126 great towns in England and Wales (including London). (b) London (administrative county). (c) The 16 principal towns in Scotland. (d) The 13 principal towns in Eire. (e) The 10 principal towns in Northern Ireland.

A dash — denotes no cases; a blank space denotes disease not notifiable or no return available.

Disease	1941 (a)	(b)	(c)	(d)	(e)	1940 (Corresponding Week) (a)	(b)	(c)	(d)	(e)
Cerebrospinal fever	266	16	65	3	24	315	29	78	1	15
Deaths		4	3				1	3		
Diphtheria	858	45	171	41	28	657	24	257	49	37
Deaths	26	2	5	1	—	28	—	6	2	—
Dysentery	69	18	32		—	33	3	39		—
Deaths	6	2		—	—			2	—	—
Encephalitis lethargica, acute	3	—	2	—	—	8	—	2	1	—
Deaths			—				—	2		
Enteric (typhoid and paratyphoid) fever	41	3	40	17	1	28	1	13	5	1
Deaths	2	1	1	1	—	—	—	—	—	—
Erysipelas			50	9	—			42	8	2
Deaths			—				—	—		
Infective enteritis or diarrhoea under 2 years										
Deaths	39	5	9	5	2	34	11	10	4	5
Measles	11,993	464	96		3	6,223	26	508		121
Deaths	13	—	2	1	—	2	—	3	—	4
Ophthalmia neonatorum	80	2	24		—	105	11	29		—
Deaths										
Pneumonia, influenzal	1,002	52	11	1	2	795	53	10	8	
Deaths (from influenza)	19	29	3	1	2	25	1	3	—	1
Pneumonia, primary			235	10	—			261	8	9
Deaths		29		11	5		33		10	16
Polio-encephalitis, acute	—	—				—	—			
Deaths		—					—			
Poliomyelitis, acute	6	1		2	—	6	—	1		—
Deaths		—	—				—	—		
Puerperal fever	1	1	15			2	2	12	3	—
Deaths							1			
Puerperal pyrexia	119	8	22		2	151	13	25		2
Deaths										
Relapsing fever	—	—			—	—	—			—
Deaths										
Scarlet fever	1,012	51	142	54	13	829	34	116	46	43
Deaths	—	—	1	—	—	1	1	—	—	—
Small-pox	—	—	—	—	—	—	—	—	—	—
Deaths	—	—	—	—	—	—	—	—	—	—
Typhus fever	—	—	—	—	—	—	—	—	—	—
Deaths			—	—	—			—	—	—
Whooping-cough	4,081	127	482		7	601	13	37		10
Deaths	27	—	17	—	—	—	—	—	2	2
Deaths (0-1 year)	377	29	91	27	15	342	48	95	23	28
Infant mortality rate (per 1,000 live births)										
Deaths (excluding still-births)	5,705	648	710	216	229	4,614	731	703	203	179
Annual death rate (per 1,000 persons living)			15.5	14.3	20.1			13.0	13.6	15.7
Live births	4,988	433	878	335	181	7,172	1,109	1008	414	277
Annual rate per 1,000 persons living			17.9	22.2	15.9			20.4	27.6	24.3
Stillbirths	203	14	40			275	38	45		
Rate per 1,000 total births (including stillborn)			44					43		

* Includes primary form in figures for England and Wales, London (administrative county), and Northern Ireland.

Medical News

Mr. F. C. R. Douglas, M.A., M.P., Chairman of the Housing Committee of the L.C.C., will read a paper on "Economic Aspects of Soil Fertility and Nutrition" before the Royal Society of Arts on Wednesday, June 11, at 2.30 p.m., at the Institution of Electrical Engineers, Savoy Place, Victoria Embankment, W.C.

A meeting of the Section of Proctology of the Royal Society of Medicine will be held on Wednesday, June 11, at 5 p.m., for a discussion on "Factors which make for Safety in the Pre-operative and Post-operative Treatment of Carcinoma of the Rectum," to be opened by Prof. E. R. Flint, Surgeon Rear-Admiral G. Gordon-Taylor, Dr. Cuthbert Dukes, and Mr. C. Naunton Morgan.

The B.B.C. announces that on Friday, June 13, at 10.15 p.m., "Blitz Doctors," a programme of incidents in the life of the Emergency Medical Services in wartime, will be heard in the Home Service. This is based on material collected by a doctor. The programme, divided into four parts, tells the story of the "doctors of the blitz" (medical men, nurses, ambulance drivers, stretcher-bearers) from their inception through the earlier war days, through the arduous waiting period right down to the moment when they went into action. The programme has been prepared in consultation with medical personnel who have been in the blitz since it started.

A meeting of the Bristol Division of the B.M.A. will be held in the Physics Lecture Theatre at the Royal Fort, University of Bristol, on Thursday, June 12, at 3.30 p.m. All members of the Association and medical non-members will be welcome. A symposium has been arranged on "Experiences of First Aid in Air Raids." Dr. J. N. Nixon, chairman of the Division, will preside, and Dr. H. M. Golding will open the discussion, followed by Prof. R. H. Parry, M.O.H. Bristol, and eight other medical men. Tea will be served after the meeting. Those intending to stay for tea should inform the hon. secretary, Dr. J. A. Hooker, before June 10.

Dr. I. Frost has been appointed medical secretary to the British Social Hygiene Council—the position recently vacated by Sir Drummond Shiels, who is now devoting his whole time to his work on the Empire Parliamentary Association, but remains the Council's medical adviser.

Letters, Notes, and Answers

All communications in regard to editorial business should be addressed to THE EDITOR, BRITISH MEDICAL JOURNAL, B.M.A. HOUSE, TAVISTOCK SQUARE, W.C.1.

ORIGINAL ARTICLES and LETTERS forwarded for publication are understood to be offered to the *British Medical Journal* alone unless the contrary be stated.

Authors desiring REPRINTS of their articles must communicate with the Secretary, B.M.A. House, Tavistock Square, W.C.1, on receipt of proofs. Authors over-seas should indicate on MSS. if reprints are required, as proofs are not sent abroad.

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B.M.A. SCOTTISH OFFICE: 7, Drumsheugh Gardens, Edinburgh.

QUERIES AND ANSWERS

Post-herpetic Neuralgia

"M.B., B.S." writes: I am at present attending an elderly gentleman who is suffering from severe post-herpetic neuralgia following an attack of herpes zoster affecting his cervical plexus. I shall be grateful for hints regarding any treatment which is likely to relieve his pain. The worst of the pain actually seems to have passed off, but the relatives are anxious that something further should be done. Would any of the forms of physiotherapy or electrotherapeutics be of any use in these cases?

Treatment of Night Sweats

"J. R. E." writes: Has "J. N. T." (March 8, p. 389) considered the possibility of undulant fever?

Income Tax

Cost of Board and Lodging of Assistant

"P" claims to deduct £2 per week in respect of a locumtenent, but the inspector of taxes considers £1 per week to be sufficient. Has he a good case for appeal to Commissioners?

* * So much depends on the precise facts of each case that * it is difficult to advise. Certainly £1 a week seems a low estimate to cover not only cost of food but also the locumtenent's share of domestic service, rent and rates, light and heat, etc. We think "P" may have a good chance of increasing the £1 per week on appeal, though the Commissioners might not go so far as to allow £2 per week. If there are no special circumstances we should advise an appeal unless the Inspector is prepared to compromise at, say, 30s. or 35s. per week.

LETTERS, NOTES, ETC.

Evening Temperatures and "Midsummer Time"

DR. W. H. PALMER (Hayle, Cornwall) suggests that the present two hours' difference between clock-time and sun-time may be leading to many errors where the old times of taking evening temperatures are adhered to. He writes: A preliminary test of this theory, in both private and hospital practice, has shown that quite a proportion of cases have not actually reached the end of their febrile stage, though the charts (kept at clock-time) indicate that they have. In some cases—for example, operation for appendicitis and peritonitis, mucopurulent bronchitis in elderly patients—there was as much as two degrees' difference between the 6.30 and 8.30 evening temperatures, and it is just in these cases that getting up too soon may have unfortunate results. Not having seen or heard this subject referred to as yet, I am drawing attention to it in case others would like to make some comparative tests for themselves.

Opalescence of the C.S.F. after Sulphapyridine

DR. W. LEES TEMPLETON (London, N.6) writes: Some time ago I reported a peculiar opalescence of the cerebrospinal fluid in cases of pneumococcal meningitis during the administration of sulphapyridine. In each case nothing abnormal was then present in the fluid, but the appearance on naked-eye examination was disconcerting when seen for the first time. Drs. D. F. Johnstone and P. Forgacs (May 24, p. 772) describe the same appearance. One wonders if the pathologists have any explanation for this phenomenon and if it is present in any other condition. Incidentally, with reference to the article mentioned in which cerebral symptoms are, it is suggested, produced by the drug, might I be allowed to point out that, if it is so, then it would seem to support the view that in meningitis sulphapyridine may act by virtue of its homoeopathicity—in other words, that the drug which can produce symptoms may in smaller doses cure the same condition.

Hips and Vitamin C

MR. A. V. WADSWORTH writes: Quite an interesting correspondence has been taking place on the above subject. No one seems to have gone into the question of the true vitamin C content of rose-hips confection. Last year I made from the hips of *Rosa rugosa* a confection by the following method. The ripe hips were boiled with a little water and strained through a sieve, an equal quantity of sugar was added, and the whole boiled until it formed a jelly on cooling. This made a very pleasant confection. The vitamin C content of the pulp of the original rose-hips was equivalent to 777 mg. of ascorbic acid per 100 grammes, and that of the final conserve was equivalent to 378 mg. of ascorbic acid per 100 grammes. These figures are far in advance of the vitamin content of the much-vaunted orange, and there is no doubt that as a source of vitamin C rose-hips cannot be ignored. The pulp of the very large hips of the *Rosa rugosa* can be eaten when ripe; it has a pleasant flavour of tomatoes. Two of these are practically equal to an orange.

Lobar Pneumonia at 100: Recovery

DR. C. E. H. MILNER (Reigate) writes: A spry and voluble old Dublin lady of a hundred summers (who says she has had two attacks of pneumonia in the past) had a rigor six days ago, and was found to have a temperature of 102.4° F. Pulse and respiration were not unduly hurried—92 and 24. Marked dullness was discovered at the left base, and the diagnosis of lobar pneumonia was obvious. The only treatment was by sulphapyridine, 1 gramme four-hourly, together with 2 drachms four-hourly of John Jamieson's best. The result was dramatic. The temperature fell, step by step, during twenty-four hours to the normal line; pulse and respiration also. Physical signs only now became elicited by auscultation, and the whole of the left lower lobe was found to be consolidated. Recovery in six days is complete, and the patient's appetite is voracious.